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Paper Industry Advised to Modernize Mills

Royal Bank of Canada In Monthly Letter Urges Paper and Pulp Concerns To Take Advantage of Present To Modernize Plants and Equipment — Wartime Work of Industry Praised — Other News.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., March 9, 1942—Strong advice to pulp and paper companies to take advantage of the present situation to modernize plant and equipment and accumulate adequate reserves against future contingencies, because it is now living on "borrowed time," is given in the current monthly letter of the Royal Bank of Canada, of which the president is Morris Wilson, chairman of the British Supply Council, whose headquarters are in Washington, D. C. The letter gives a lengthy review of the operations of the industry during the past year. The estimate which it places upon the value of all pulp and paper exports during 1941 is $260,000,000, as compared with $232,000,000 in 1940 and $155,000,000 in 1939, adding that "by far the larger part of these exports was consigned to the United States and other countries outside the 'Sterling area', resulting in welcome accumulations of United States dollars. Apart from exports of gold bullion, Canada's largest single source of United States exchange was newsprint shipments, valued in 1941 at $155 million."

It is further pointed out that there had been little or no necessity for the pulp and paper industry to add to existing plant or to install specialized equipment useful only for the duration of the war, because large reserves of excess capacity enabled the industry to take immediate advantage of increased demand resulting from greater utilization of pulp and paper products during wartime as well as from dislocations in overseas trade.

On the question of actual productive capacity in relation to newsprint it has these interesting observations: "The concept of productive capacity in an industry such as newsprint manufacturing is, of course, somewhat elastic. In actual practice, effective capacity is determined by the current price received, the volume of output, and the relation of each of these factors to the profitable operation of marginal plants. At the present time it may be assumed that all low-cost plants are operating at, or close to, capacity. An advance in the base price of newsprint from $50 to $53 per ton, as recently announced for the second quarter of 1942, would mean an additional $10 million to the Canadian industry at current rates of operation."

A very different situation developed, however, in relation to supplies of sulphite and other chemically treated pulps. Abrupt curtailment of Scandinavian supplies created a demand far beyond productive capacity, and on this the review says:

"Attempts by Canadian manufacturers to fill United States pulp deficiencies, in addition to those of Great Britain and other countries formerly dependent on European supplies, have taxed productive facilities in this country. While it is probable that this situation will gradually adjust itself, an extremely high level of operation seems assured for the duration of the war. Due to uncertainties regarding post-war trade conditions, however, every method of conservation, salvage and substitution should be carefully explored in order to avoid, if possible, the construction of excess capacity."

Concluding, the review offers the following observations and warning: "It appears probable that demand for Canadian pulp and paper will continue at a high level for the duration of the war. It must, however, be pointed out that the present prosperity is likely to be transitory and the industry as long as the war lasts will be 'living on borrowed time.' While it is not possible to predict the future with any degree of accuracy, the return of peacetime conditions will undoubtedly involve painful readjustments. Under these circumstances full advantage must be taken of the current improvement in operations to strengthen and consolidate the position of the industry—to improve and modernize plant and equipment, to retire debts of long standing, to build up working capital, and to accumulate adequate reserves against future contingencies."

Stationery Frills "Out" for Duration

The Wartime Prices and Trade Board, in announcing further regulations to conserve materials and avoid waste in paper products, states that frills are out from now on in the manufacture of boxed stationery.

(Continued on page 22)

Wisconsin Mill Employment Gains in Year

Commission Reports Number of Workers Increased 7.9% In 1941—Payrolls 21.2% Higher—Average Weekly Earnings Rose To $35.12—Work On Sulphite Liquor Waste Disposal Methods Progresses.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., March 9, 1942—Employment as a measuring stick of production of pulp, paper and converting items in Wisconsin reveals a total gain of 7.9% in the number of workers for the year 1941 as compared to the year 1940, according to a summary prepared by the Wisconsin Industrial Commission at Madison, Wis. In 1940, the total number of wage earners was 21,700, and in 1940, the average for the year was 23,300.

Quite a different picture obtains, however, in the upturn of wages and payrolls. Weekly payrolls averaged $566,000 in 1940, but jumped to an average of $685,000 in 1941, a gain of 21.2%. Increases granted from time to time by most of the mills have resulted in average weekly earnings of $29.29 for 1941, as compared with $26.12 in 1940. Workers were putting in an average of 42.7 hours per week in 1941, compared with 40.7 the previous year.

In terms of employee-hours per week, the average was increased from 881,000 in 1940 to 998,000 in 1941, an upswing of 13.3%.

Printing and publishing in Wisconsin followed the paper trend with 9,600 on the payrolls in 1940 and 10,100 in 1941, a gain of 5%. Weekly payrolls were up 9.8% for 1941, with $354,000 as compared with $322,000 the previous year. Average weekly earnings rose from $33.58 in 1940 to $35.12 in 1941, and the average number of hours per week from 39 to 40.

Since the first of the year, there has been a slight tapering off in employment in paper mills and allied industries, however. The total number of wage earners dropped from 24,000 in December, 1941 to 23,700 in January, 1942, a decline of 1.4%. January employment, however, was up 9.2 from the same month of 1941.

The more static condition of payrolls was reflected in a drop of 1.5% in January over December, about the same proportion as the employment. Weekly payrolls averaged $740,000 in January as compared with $752,000 in December, but were up 25.5% over January a year ago, when the total was $590,000.

Mill workers are now receiving an average of 73.3 cents per hour for 42.7 average hours per week, or a weekly check of $31.30.

Carton and converting plants in the Milwaukee metropolitan area reduced employment 3.7% for January over December, with 2,028 on the payrolls. Payrolls declined 4.8% for the month to a total of $58,242. Hourly rate averaged 68.5 cents, or $28.72 per week for 41.9 hours.

Badger Tissue Mills, Kaukauna, Wis., is one of the latest to increase wages. Employees were paid an additional three cents per hour beginning February 23, according to Lewis F. Nelson, president. Mr. Nelson, who previously served as mayor of Kaukauna, has been appointed to the position again to fill a vacancy caused by the death of Mayor William Gantter. Mr. Nelson will be a candidate for the office at the spring election in April.

Dr. Trytten Goes to Ripon College

Dr. Ronald A. Trytten, who has been associated with Kimberly-Clark Corporation mills at Niagara and Kimberly, Wis., has resigned to accept a position as head of the chemistry department of Ripon College, Ripon, Wis. He will fill a vacancy caused by a leave of absence granted Dr. Augustus L. Barker, who has been called to service in the army chemical warfare division. Dr. Trytten is a native of Tower City, N. D., did his under-graduate work at St. Olaf's college, Northfield, Minn., and received his doctor's degree at the University of Wisconsin in 1941.

Work on Disposition of Waste Liquor Progresses

Progress which has been made in methods of disposing of sulphite waste liquor will be reported at a meeting Tuesday, March 10 of fifteen members of the technical division of the Sulphite Pulp Manufacturers' Committee on Waste Disposal. The morning session will be held at the Kimberly-Clark Corporation offices at Neenah, Wis., and the afternoon session at the Institute of Paper Chemistry, Appleton, whose research staff has been working on disposal experiments.

Sulphite Mills Represented

Twelve Wisconsin sulphite mills are represented in the group, which has cooperated with the state health and conservation interests in reducing stream pollution caused by industrial waste. The studies have been financed by these mills.

Civilian Defense To Protect Forests

Civilian defense activities for Wood County, Wisconsin, will include a forest protection group of about 500 men, according to plans made at a meeting last week at Wisconsin Rapids, Wis. Assisting in organizing the division are F. G. Kilp, chief forester for the Nekoosa-Edwards Paper Company, Port Edwards, and E. B. Hurst, forester for the Consolidated Water Power and Paper Company, Wisconsin Rapids. Mills of both companies are located within the county, and the extensive Nekoosa-Edwards forest plantations also are within its boundaries. Auxiliary fire-fighting service will be one of the main objectives, cooperating with conservation authorities.

Bassett-Whiting Nuptials

Miss Frances Whiting, daughter of Frank B. Whiting, Neenah, Wis., and Robert C. Bassett attorney of Green Bay, Wis., were married at Whiting Memorial Baptist church, Neenah, Saturday evening, February 28. Miss Whiting's father is president of the George A. Whiting Paper Company, Menasha, Wis., and the Whiting-Plover Paper Company, Stevens Point, Wis. A reception was held after the ceremony at the North Shore Golf Club, and the couple left on a honeymoon trip to Florida and the Bahamas. Mr. Bassett is chief legal counsel for the Republican party of Wisconsin.

No Canadian Newsprint Shortage Foreseen

Large Reserves of Unused Capacity Considered Adequate To Meet All Reasonable and Actual Requirements of U. S. Publishers—No Shortage In Transportation, Labor and Power Facilities Likely.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., March 9, 1942—Notwithstanding accumulating evidence that considerable apprehension has been developing among United States publishers concerning future supplies of newsprint, due to rumors of transportation difficulties, shortages of electric power and labor, Canadian newsprint interests are reassuring and maintain that the only real danger in the situation lies in those publishers who buy beyond reasonable requirements to make sure they are safe, regardless of how their actions affect others.

Large reserves of excess capacity enabled the industry to take immediate advantage of increased demand resulting from greater utilization of pulp and paper products during wartime as well as from dislocations in overseas trade. Unlike most Canadian industries faced with the tremendous task of adapting their facilities to war-time production, there was little or no necessity for the pulp and paper industry to add to existing plant or to install specialized equipment useful only for the duration of the war. Yet the industry has met all demands to date and at present there is nothing to indicate that there will be any considerable increase in demand for the current year at least, or that present facilities will not be adequate to take care of all customers.

No Shortage of Newsprint Likely

Rumors have been in circulation in the United States that newsprint supplies might not flow quite so freely as usual in the near future because shipments by water were becoming so limited and the railways becoming so congested with the tremendous war demands. It is also being said that because of Canada's huge industrial expansion for war, there was going to be a shortage of electrical power and some power would have to be diverted from the newsprint mills, thus curtailing production. Manifestly the genesis of these rumors was pure speculation on the part of some who were not thoroughly familiar with the situation. The result of the rumors has been some uneasiness and a little stocking up by a few publishers. This, if allowed to develop to any great extent, would constitute a threat to orderly marketing and militate against all concerned.

The known facts concerning the position of the pulp and paper industry at present do not indicate any reason whatsoever for apprehension on the part of American publishers concerning adequate supplies. The gigantic upheaval in Canadian industry due to the conversion of manufacturing facilities of unessentials to war production, with its consequent dislocation and re-routing of materials into different channels, makes it impossible for even the best informed to predict with any degree of accuracy what may or may not happen in any industry before the war is over. The pulp and paper industry is in the same position in that respect as every other industry. The best anyone can do is to keep informed through essential statistics of his own industry and interpret the trends in the light of past experience tempered by a realistic view of business in general.

Facts of Newsprint Supply Situation

The pertinent facts of the situation then are: (1) that last year Canadian newsprint mills produced 3,425,000 tons, and apparently shipped it all somewhere. What with governments endeavoring by legislation and persuasion to get people to buy less consumer goods, the converting of luxury and non-essential manufacturing facilities to war production, the conservation of materials of all sorts and the many other influences at work to curb public spending, there does not appear to be much likelihood that there will be any great increase in advertising lineage and, therefore, no increase in demand for newsprint.

(2) Canadian newsprint capacity was not fully occupied last year. The industry operated at about 75% capacity. During the last half of 1941 some of this spare capacity was utilized in the production of kraft substitutes. Production of these newer products was going at the rate of 225,000 tons a year until quite recently. There has been a substantial falling off, however, in demand for these products and a further decline is not only possible, but probable. It is claimed now that the paper shortage in the United States was not nearly so acute as it was at first supposed to be. Another reason given for the falling off of demand in this particular is the ruling of the U. S. government limiting the size of inventories to prevent hoarding. Whatever the reasons, it is a fact that the demand for nine-point corrugated paper and other kraft substitutes has fallen off sharply and there is still a surplus capacity for the production of newsprint.

(3) railway officials are optimistic regarding their ability to take care of all business offering in spite of the tremendous demands from war industries. That is, providing business generally co-operates in getting cars unloaded promptly. There may be delays, but eventually the goods will be delivered where needed.

(4) Labor supply both in the newsprint mills and in the woods seems to be fairly well assured. Employment in paper mills is steady and well paid and turnover is not as great as in some other industries.

(5) although a power shortage may develop in Canada and newsprint mills might be asked to supply some of their hydro-electric power, they have a surplus, and could give up perhaps three-quarters of a million h.p. annually without interfering with their ability to supply all demands for newsprint.

Optimism Seems Justified

Taking all these things into consideration, the Canadian newsprint industry seems to be justified in its optimism that it can take care of any and all demands on its production capacity and deliver the goods when and where required, provided only that publishers will not become panicky and interfere with orderly marketing.

Award Contracts for Government Paper

Joint Congressional Committee On Printing Announces Successful Bidders For Supplying the Government Printing Office With Numerous Kinds of Paper For the Period Beginning April 1, 1942.

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 9, 1942—The Joint Congressional Committee on Printing today announced awards for several million pounds of paper for the use of the Government Printing Office for the three months period beginning April 1. The awards are for bids opened on March 7. They are as follows:

No. 1, Marquette Paper Co., 2.65 cents.

No. 3, Marquette Paper Co., 7.315 cents.

No. 4, Frank Parsons Paper Co., 6.734 cents.

No. 5, Marquette Paper Co., 6.734 cents.

No. 6, Mudge Paper Co., 7.05 cents.

No. 7, R. P. Andrews Paper Co., 7.06 cents.

No. 8, Frank Parsons Paper Co., 6.383 cents.

No. 9, Mudge Paper Co., 7.05 cents.

No. 10, Frank Parsons Paper Co., 6.086 cents.

No. 11, Marquette Paper Co., 6.98 cents (200,000 pounds only); Mudge Paper Co., 7.14 cents (balance).

No. 12, Marquette Paper Co., 6.65 cents.

No. 13, Stanford Paper Co., 7.32 cents.

No. 14, No bids.

No. 18, Old Dominion Paper Co., 7.59 cents.

No. 20, Paper Corp. of U. S., 7.94 cents.

No. 21, Walker Goulard Plehn Co., 7.22 cents (400,000 pounds); Marquette Paper Co., 7.30 cents (400,000 pounds).

No. 22, Cauthorne Paper Co., Inc., 6.85 cents.

No. 23, Stanford Paper Co., 8.91 cents.

No. 24, Old Dominion Paper Co., 17.58 cents.

No. 26, Dill & Collins, Inc., 12.36 cents.

No. 27, Old Dominion Paper Co., 12.98 cents.

No. 28, Dill & Collins, Inc., 12.36 cents.

No. 29, Paper Corp. of U. S., 17.55 cents.

No. 31, Paper Corp. of U. S., 21.20 cents.

No. 32, R. P. Andrews Paper Co., 19.99 cents.

No. 33, Frank Parsons Paper Co., 6.734 cents.

No. 34, R. P. Andrews Paper Co., 7.08 cents.

No. 35, Marquette Paper Co., 6.383 cents.

No. 36, Paper Corp. of U. S., 6.69 cents.

No. 37, Barton, Duer & Koch, 6.20 cents.

No. 38, R. P. Andrews Paper Co. 6.02 cents (500,000 pounds); Mead Sales Co., 6.17 cents (balance).

No. 39, Barton, Duer & Koch Paper Co., 5.85 cents.

No. 40, R. P. Andrews Paper Co., 5.61 cents (300,000 pounds); Whitaker Paper Co., 5.64 cents (balance).

No. 41, Perkins-Goodwin Co., 8.00 cents.

No. 42, Butler Company, 14.00 cents.

No. 43, Old Dominion Paper Co., 13.33 cents.

No. 44, Frank Parsons Paper Co., 5.20 cents.

No. 45, Cauthorne Paper Co., Inc., 6.70 cents.

No. 46, Cauthorne Paper Co., Inc., 7.95 cents.

No. 48, Old Dominion Paper Co., 10.28 cents (1,000,000 pounds); Paper Corp. of U. S., 10.25 cents (300,000 pounds); Aetna Paper Co., 10.32 cents (balance).

No. 49, Old Dominion Paper Co., 9.93 cents.

No. 51, R. P. Andrews Paper Co., 11.98 cents.

No. 52, R. P. Andrews Paper Co., 11.50 cents (white); 12.00 cents (blue).

No. 53, Paper Corp. of U. S., 13.50 cents.

No. 54, Cauthorne Paper Co., Inc., 8.25 cents.

No. 55, Whitaker Paper Co., 6.87 cents (1,000,000 pounds; 6.95 cents (1,000,000 pounds); 6.99 cents (1,000,000 pounds).

No. 56, Perkins-Goodwin Co., 7.12 cents (1,800,000 pounds); Whitaker Paper Co., 7.04 cents (1,600,000 pounds); R. P. Andrews Paper Co., 7.03 cents (1,000,000 pounds); Barton, Duer & Koch Paper Co., 7.14 cents (100,000 pounds).

No. 57, Cauthorne Paper Co., 7.75 cents.

No. 58, R. P. Andrews Paper Company, 6.53 cents.

No. 59, Barton, Duer & Koch Paper Co., 6.64 cents.

No. 60, No bids.

No. 61, Whitaker Paper Co., 8.15 cents (blue, buff, green, pink, yellow); Marquette Paper Co., 8.60 cents (cherry, salmon).

No. 62, Marquette Paper Co., 7.75 cents.

No. 63, Marquette Paper Co., 5.15 cents.

No. 64, R. P. Andrews Paper Co., 8.97 cents.

No. 65, Stanford Paper Co., 15.86 cents (250,000 pounds); Collins Mnfd. Co., 16.50 cents (100,000 pounds); Graham Paper Co., 16.00 cents (100,000 pounds); 15.52 cents (50,000 pounds).

No. 66, Paper Corp. of U. S., 17.86 cents (200,000 pounds); Mudge Paper Co., 18.86 cents (200,000 pounds).

No. 67, Paper Corp. of U. S., 17.61 cents.

No. 69, Paper Corp. of U. S., 23.15 cents.

No. 70, Marquette Paper Co., 9.50 cents.

No. 71, Marquette Paper Co., 9.00 cents.

No. 72, Walker Goulard Plehn Co., Inc., 12.78 cents (40,000 pounds); North American Pulp & Paper Co., 13.25 cents (balance).

No. 73, North America Pulp & Paper Co., 11.00 cents.

No. 75, Marquette Paper Co., 21.00 cents.

No. 76, Stanford Paper Co., 21.50 cents (80,000 pounds); Paper Corp. of U. S., 21.82 cents (40,000 pounds); Butler Co., 20.85 cents (120,000 pounds); Walker Goulard Plehn Co., Inc., 20.97 cents (60,000 pounds); Chicago Paper Co., 19.65 cents (60,000 pounds); Barton Duer & Koch Paper Co., 20.25 cents (120,000 pounds); 21.00 cents (100,000 pounds).

No. 77, Paper Corp. of U. S. ,21.32 cents (40,000 pounds); Walker Goulard Plehn Co., 19.94 cents (60,000 pounds).

No. 78, Marquette Paper Co., 24.00 cents.

No. 79, Walker Goulard Plehn Co., 21.84 cents (20,000 pounds).

No. 80, Paper Corp. of U. S., 20.97 cents.

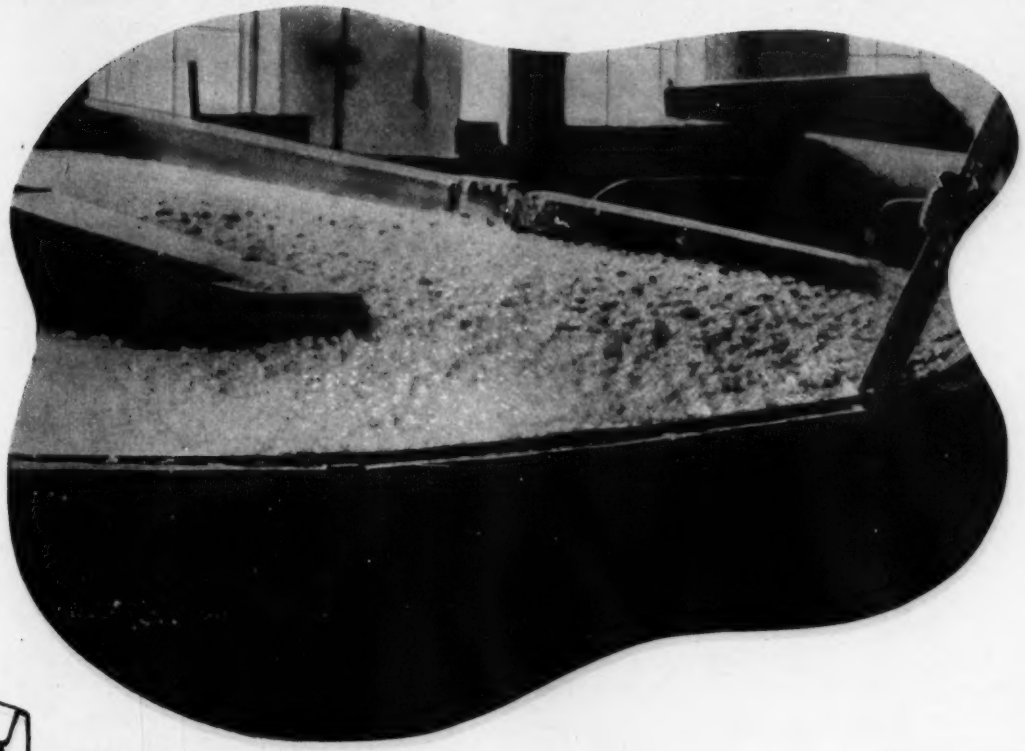
No. 83, R. P. Andrews Paper Co., 38.50 cents.

No. 84, Old Dominion Paper Co., 29.248 cents.

No. 85, Barton Duer & Koch Paper Co., 23.00 cents (150,000 pounds); R. P. Andrews Paper Co., 27.80 cents (90,000 pounds).

No. 102, R. P. Andrews Paper Co., 7.18 cents

IT'S HARD ENOUGH TO GET

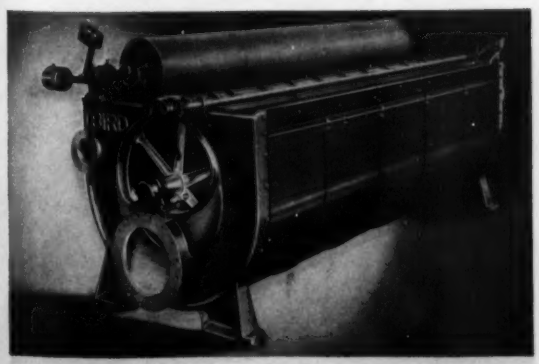


Why Dump It Down the Drain?

After you've gotten the stock and gone to all the trouble and expense of preparing it for the paper machine it's a crime to let any of it get away—especially now.

Better take another look at your shrinkage figures. A Bird Save-All system turns every pound of stock into good, salable paper.

We stand ready to work out the facts and figures with you any time you say the word.



BIRD MACHINE COMPANY
SOUTH WALPOLE — MASSACHUSETTS

BIRD SAVE-ALL

(500,000 pounds); Eastern Corp., 7.28 cents (balance).

No. 103, R. P. Andrews Paper Co., 6.94 cents.

No. 105, Aetna Paper Co., 16.23 cents (200,000 pounds).

No. 106, Virginia Paper Co., 13.40 cents (40,000 pounds); Aetna Paper Co., 13.24 cents (100,000 pounds); Central Ohio Paper Co., 13.89 cents (100,000 pounds).

No. 107, Walker Goulard Plehn Co., Inc., 13.30 cents (50,000 pounds); 13.90 cents (100,000 pounds); Aetna Paper Co., 12.92 cents (400,000 pounds); Barton Duer & Koch Paper Co., 13.30 cents (200,000 pounds); Mathers Lamm Paper Co., 13.40 cents (40,000 pounds); Bulkley Dunton & Co., 12.99 cents (100,000 pounds).

No. 108, Wilcox-Walter-Furlong Paper Co., 12.99 cents (100,000 pounds); Butler Co., 13.58 cents (600,000 pounds); Aetna Paper Co., 12.92 cents (400,000 pounds); Walker Goulard Plehn Co., 13.30 cents (50,000 pounds); 13.90 cents (100,000 pounds).

No. 109, Whitaker Paper Co., 12.89 cents (200,000 pounds); Collins Mnfng. Co., 13.90 cents (100,000 pounds); R. P. Andrews Paper Co., 13.37 cents (100,000 pounds); Walker Goulard Plehn Co., 13.30 cents (50,000 pounds).

No. 110, No bids.

No. 111, No bids.

No. 112, No bids.

No. 113, R. P. Andrews Paper Co., 17.97 cents (50,000 pounds); Aetna Paper Co., 16.98 cents (100,000 pounds).

No. 114, Cauthorne Paper Co., Inc., 14.59 cents (100,000 pounds); Aetna Paper Co., 13.99 cents (100,000 pounds).

No. 115, Collins Manfg. Co., 14.62 cents (100,000 pounds); Aetna Paper Co., 13.67 cents (100,000 pounds); Forest Paper Co., Inc., 13.89 cents (100,000 pounds).

No. 116, No bids.

No. 117, No bids.

No. 118, No bids.

No. 120, R. P. Andrews Paper Co., 19.57 cents (100,000 pounds); Aetna Paper Co., 18.47 cents (50,000 pounds).

No. 121, Garrett-Buchanan Paper Co., 15.29 cents (100,000 pounds); Baxter Paper Co., 15.43 cents (250,000 pounds); Aetna Paper Co., 14.92 cents (400,000 pounds); Barton Duer & Koch Paper Co., 15.29 cents (100,000 pounds); Graham Paper Co., 15.52 cents (240,000 pounds).

No. 122 Baxter Paper Co., 15.43 cents (200,000 pounds); Paper Corp. of U. S., 14.50 cents (50,000 pounds); Collins Mnfg. Co., 15.40 cents (100,000 pounds); R. P. Andrews Paper Co., 15.09 cents (100,000 pounds); Central Ohio Paper Co., 15.89 cents (100,000 pounds).

No. 123, Bradner Smith & Co., 15.00 cents (100,000 pounds); Carpenter Paper Co., 15.00 cents (100,000 pounds).

No. 124, Collins Mfg. Co., 16.62 cents (40,000 pounds).

No. 125, No bids.

No. 126, No bids.

No. 128, R. P. Andrews Paper Co., 24.38 cents.

No. 129, R. P. Andrews Paper Co., 24.38 cents.

No. 140, Stanford Paper Co., 26.40 cents.

No. 141, Paper Corp. of U. S., 25.10 cents.

No. 151, Aetna Paper Co., 8.22 cents.

No. 152, Marquette Paper Co., 8.25 cents.

No. 154, Aetna Paper Co., 14.04 cents.

No. 155, Walker Goulard Plehn Co., Inc., 14.79 cents.

No. 156, Walker Goulard Plehn Co., Inc., 14.79 cents.

No. 157, Collins Mnfg. Co., 15.57 cents.

No. 160, Aetna Paper Co., 16.02 cents (100,000 pounds); Mudge Paper Co., 15.96 cents (100,000 pounds).

No. 161, Walker Goulard Plehn Co., 15.34 cents.

No. 162, Collins Mnfg. Co., 16.35 cents (100,000 pounds); Mudge Paper Co., 16.26 cents (100,000 pounds); Frank Parsons Paper Co., 16.50 cents (balance).

No. 163, Walker Goulard Plehn Co., 15.34 cents (50,000 pounds); 15.97 cents (100,000 pounds).

No. 164, Walker Goulard Plehn Co., 16.97 cents.

No. 165, Walker Goulard Plehn Co., 17.49 cents.

No. 168, Barton Duer & Koch Paper Co., 20.00 cents.

No. 169, Barton Duer & Koch Co., 20.00 cents.

No. 170, Resolute Paper Products Corp., 20.25 cents (20,000 pounds); Walker Goulard Plehn Co., 20.40 cents (balance).

No. 171, Walker Goulard Plehn Co., 20.24 cents.

No. 172, Mudge Paper Co., 23.15 cents.

No. 173, Mudge Paper Co., 23.15 cents.

No. 176, R. P. Andrews Paper Co., 25.08 cents.

No. 177, R. P. Andrews Paper Co., 25.08 cents.

No. 178, R. P. Andrews Paper Co., 25.08 cents.

No. 179, R .P. Andrews Paper Co., 25.08 cents.

No. 180, R. P. Andrews Paper Co., 25.00 cents.

No. 181, R. P. Andrews Paper Co., 25.00 cents.

No. 184, Whitaker Paper Co., 7.67 cents.

No. 190, Aetna Paper Co., 14.74 cents (100,000 pounds); Barton Duer & Koch Paper Co., 15.03 cents (500,000 pounds).

No. 191, Paper Corp. of U. S., 15.70 cents.

No. 192, Paper Corp. of U. S., 16.40 cents (150,000 pounds); Walker Goulard Plehn Co., 16.79 cents (150,000 pounds).

No. 193, Paper Corp. of U. S., 16.40 cents (50,000 pounds).

No. 196, Barton Duer & Koch Paper Co., 24.75 cents (60,000 pounds); Frank Parsons Paper Co., 25.50 cents (40,000 pounds).

No. 197, Mathers Lamm Paper Co., 16.25 cents.

No. 201, Perkins Goodwin Co., 9.35 cents.

No. 202, Butler Co., 10.00 cents (emerald, green); Perkins Goodwin Co., 9.75 cents (light green, india).

No. 203, R. P. Andrews Paper Co., 8.47 cents.

No. 204, R. P. Andrews Paper Co., 8.47 cents.

No. 205, R. P. Andrews Paper Co., 11.87 cents.

No. 209, Paper Corp. of U. S., 5.32 cents.

No. 210, Old Dominion Paper Co., 4.7349 cents.

No. 211, R. P. Andrews Paper Co., 7.65 cents.

No. 212, R. P. Andrews Paper Co., 7.40 cents.

No. 213, Paper Corp. of U. S., 20.25 cents.

No. 214, Paper Corp. of U. S., 20.25 cents.

No. 215, Mudge Paper Co., 23.40 cents.

No. 217, No bids.

No. 218, No bids.

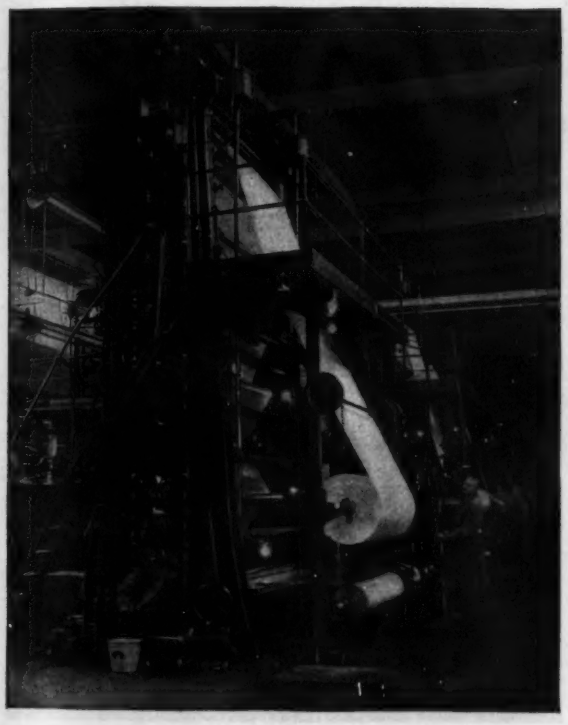
No. 219, W. L. Jones Inc., 4.80 cents (250,000 pounds); W. L. Jones Inc., 4.655 cents (250,000 pounds).

No. 220, Paper Corp. of U. S., 7.50 cents.

No. 251, Old Dominion Paper Co., 12.72 cents.

RUNNING 24 HOURS A DAY 7 DAYS A WEEK AT FAST SPEEDS

And Norwood Calenders Give Top-Quality Production With Exceptionally Low Maintenance Costs



Some of the many Norwood Glassine Calenders at Riegel Paper Corporation mill at Milford, N. J. The machine in the foreground is a 73" Norwood and is running at a speed of 900 feet per minute.

Norwood Calenders Will Help You Speed Production, Too!

NORWOOD Calenders will help you speed up your production, for they are soundly designed and sturdily built. You can run them at fast speeds, for long days, but they will "stand the gaff" and turn out good work at low operating and maintenance costs.

The Riegel Paper Mill at Milford, N. J., is running many of their Norwood Calenders at high speeds, turning out high-transparency glassines. Their head finisher recently reports that they are running 24 hours a day, seven days a week . . . that they have never lost a bottom bearing on any of their Norwood calenders . . . that the maintenance of these calenders has always been very low, both in terms of necessary repairs and in lost labor time due to break-downs during production . . . that the calenders stand up well with the minimum of maintenance trouble.

You, too, can depend on Norwood Calenders to help you speed production . . . to give you exceptionally good finishes . . . to give you mighty fine service at low operating and maintenance costs. Start now to speed your production. Investigate Norwood Calenders today.

Don't let your finishing room be your production bottleneck. Norwood's engineers will give you wholehearted cooperation. If you have a finishing problem, write us about it today.

Send For Engineering Data Units

We have helpful Engineering Data Units covering Norwood Equipment. Send for your set today.

Calenders. Ask for Portfolio C for a complete set of data units on Norwood Calenders.

Filters. Ask for Portfolio F for a complete set of data units on Norwood Water Filters.

WE CAN DELIVER We can still deliver your Calender or Filter within a reasonable length of time . . . but the sooner you place your order, the quicker you will get delivery. Place Your Order Now.

Get a Good Start And a Good Finish With
NORWOOD
WATER FILTERS AND PAPER FINISHING MACHINERY

The NORWOOD ENGINEERING COMPANY
17 No. Maple St., Florence, Mass.

No. 252, Paper Corp. of U. S., $12.87 cents per M sheets.
No. 254, Whitaker Paper Co., 7.19 cents.
No. 255, Walker Goulard Plehn Co., 8.08 cents.
No. 256, Whitaker Paper Co., 7.92 cents.
No. 257, R. P. Andrews Paper Co., 8.47 cents.
No. 258, Mudge Paper Co., 7.24 cents.
No. 259, R. P. Andrews Paper Co., 6.37 cents.
No. 262, Link Paper Co., 8.79 cents.
No. 263, Barton Duer & Koch Paper Co., 8.50 cents.
No. 264, Barton Duer & Koch, 4.92 cents.
No. 265, Mudge Paper Co., 8.25 cents.
No. 271, R. P. Andrews Paper Co., 7.25 cents.
No. 276, Barton Duer & Koch Paper Co., 8.25 cents.
No. 277, Barton Duer & Koch Paper Co., 9.25 cents.
No. 280, Mudge Paper Co., 11.25 cents.
No. 281, R. P. Andrews Paper Co., 5.43 cents.
No. 302, Paper Corp. of U. S., 26.93 cents per M sheets.
No. 303, Paper Corp. of U. S., $38.78 cents per M sheets.
No. 304, Bradner Smith & Co., $54.30 cents per M sheets.
No. 305, Paper Corp. of U. S., $33.74 cents per M sheets.
No. 306, Frank Parsons Paper Co., 5.47 cents.
No. 307, Frank Parsons Paper Co., 5.74 cents.
No. 308, Old Dominion Paper Co., 5.4524 cents.
No. 309, Old Dominion Paper Co., 5.4524 cents.
No. 310, Old Dominion Paper Co., 5.824 cents.
No. 351, Barton Duer & Koch Paper Co., $7.75 cents per C sheets.
No. 352, Barton Duer & Koch Paper Co., $18.85 cents per C sheets.
No. 360, Whitaker Paper Co., 2.424 cents.
No. 361, Whitaker Paper Co., 2.16 cents.
No. 362, Mathers Lamm Paper Co., 4.934 cents.
No. 363, Mathers Lamm Paper Co., 4.50 cents.
No. 364, Whitaker Paper Co., 3.18 cents.
No. 365, Mudge Paper Co., 3.028 cents.
No. 366, Mathers Lamm Paper Co., 4.08 (375,000 pounds); R. P. Andrews Paper Co., 4.14 (balance).
No. 367, R. P. Andrews Paper Co., 4.14 cents.
No. 368, Barton Duer & Koch Paper Co., 5.25 cents.

Container Thickness Redefined

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 11, 1942—The WPB Containers Branch points out that the November, 1941 changes in specifications for paper board shipping containers were not intended to establish maximum thicknesses for the materials used in making such containers.

Modified regulations governing the shipping of freight in corrugated and solid fiber board containers were announced November 3, 1941. These specifications, permitting the use of thinner paper board parts, were expected to save approximately 10% of normal paper board consumption.

The belief of some shippers that the new specifications covered maximum rather than minimum requirements, is not true, the Branch stated. While the changes in the specifications, Supplement 17 to Consolidated Freight Specifications Number 14, reduced the minimum requirements, it was not intended to affect packing of articles requiring a stronger box. The revised specifications must be exceeded in some cases, it was pointed out, in order to transport certain commodities safely.

The Branch emphasized that it does not advocate the use of inadequate shipping containers. If shippers were to adopt the minimum specifications, which became effective November 15, 1941, as maximum specifications, there might be greater losses in goods and materials than could possibly be equalized by savings effectuated by modified specifications. Heavier car loadings, rougher handling, not only by railroads, but all along the line of production, necessitates continuous discretion on the part of shippers, it was pointed out.

To Reopen Oakland Mill

The corporation formed last year to operate the paper mill in Oakland known as the Pennaconn Company, has given up operations of the mill and the 33 employed there have been dismissed, according to the Herald of Manchester, Conn.

A new corporation known as the Lowe Paper Corporation from New York has been incorporated for $50,000 and has $20,000 cash paid in, according to papers on file at the town clerk's office. The incorporators are John C. Lowe of Manchester, James A. Stabile of New York City, and S. B. Ferriss of Manchester.

In closing the mill the employees were told trouble was had in securing stock to manufacture the heavy grade of paper used for making boxes, as it did not carry priority rights.

The new corporation is formed to manufacture a heavy grade of paper and in a letter that has been sent to all of the former employees, they are asked to report to the mill office for an interview as it is again desired to start the mill. The letter is signed by S. B. Ferriss, who was with the Pennaconn company. Most of the employees of the Pennaconn corporation have secured work in other mills.

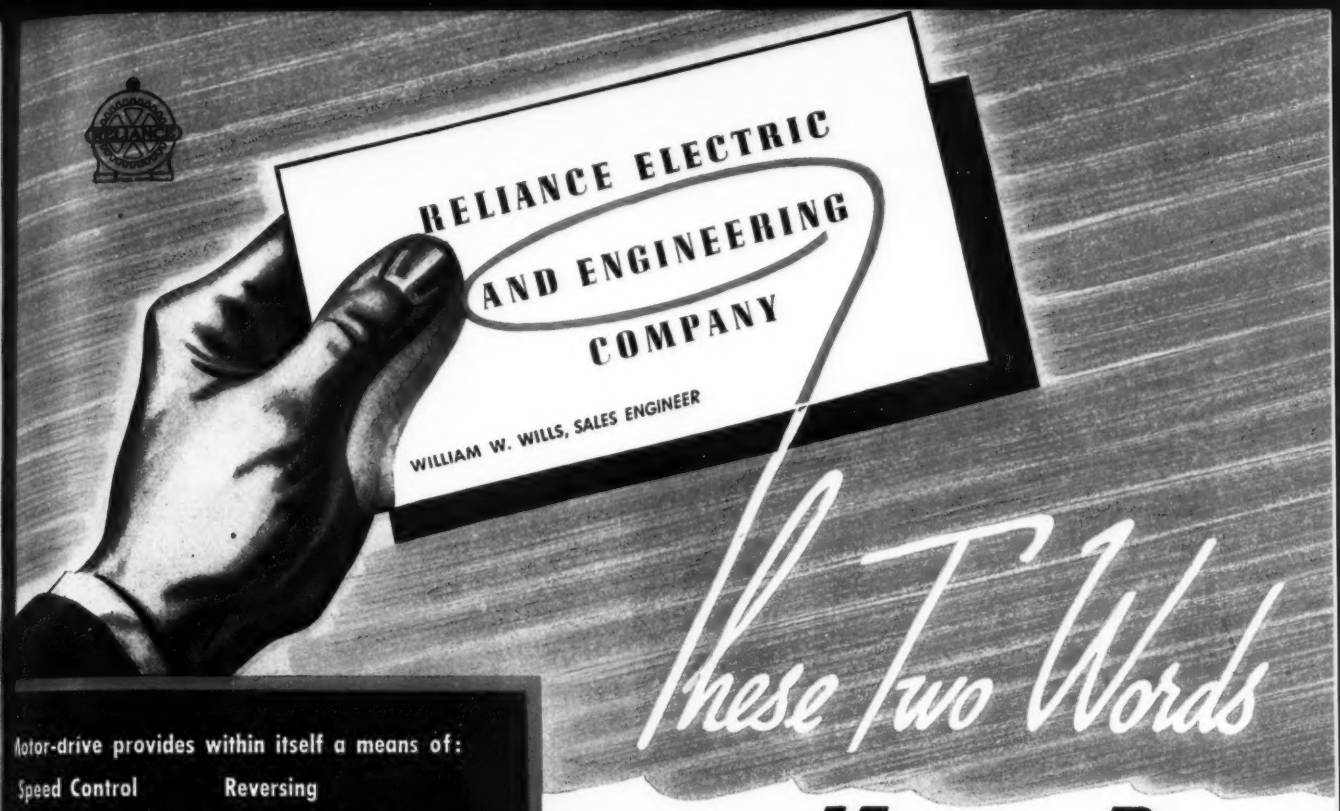
William H. Cartland Dead

William H. Cartland, 73, of 258 Main street, Wakefield, Mass., salesman for Stone & Forsyth Co., Boston, died from a heart attack March 4 while riding to Boston in the automobile of Ralph L. Bangs, also of Wakefield.

He was a native of Portland, Me., but a resident of Wakefield most of his life. He was president of the Lakeside Cemetery Corporation in Wakefield, a charter member and former president of the Wakefield YMCA and active in the affairs of the First Church, Congregational, Wakefield. He was former secretory of the town finance committee and a life member of Golden Rule lodge of Masons.

Sokolsky to Address Waste Dealers

G. E. Sokolsky, well known author, columnist and radio broadcaster, will speak at the banquet of the National Association of Waste Material Dealers at the Hotel Astor, New York, Wednesday evening, March 18, which closes the annual convention of the association. Because of the excellence of the program, there is an unprecedented demand for tickets.



These Two Words

Motor-drive provides within itself a means of:

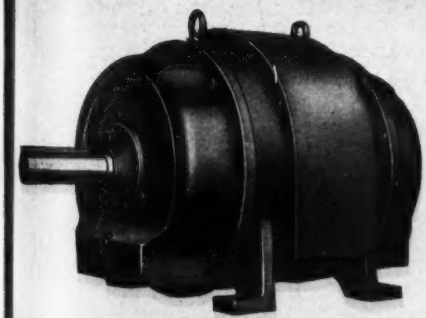
Speed Control	Reversing
Braking	Remote Control
Tandem Operation	Controlled Acceleration
Tension Control	Safety

Slow Speeds for inching, threading, inspection

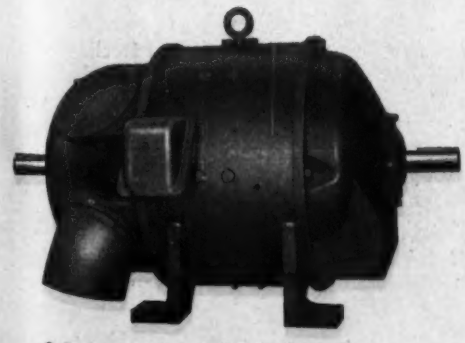
Applying them to boost production and improve quality is APPLICATION ENGINEERING. That's our business.

MAKE *MOTOR-DRIVE* *MORE THAN* POWER!

The man who sends this Reliance card to you is skilled in Application Engineering. He is prepared to discuss motor-drive as a means for boosting production and improving the quality of the products made in your plant. He represents an organization whose "bread and butter" for 35 years has come from showing industry how electric motors can be used profitably to do *many things* besides turn shafts and gears. To get the most from these production aids call in a Reliance man when your plans are in the early stages. He can help make motor-drive an integral part of your production equipment and not an appendage. No obligation, of course.



Splash-proof Type AA Squirrel-cage A-c. Induction Motor with ball bearings.



Splash-proof Type T D-c. Reliance Motor with ball bearings.

RELIANCE ELECTRIC & ENGINEERING CO.
1088 Ivanhoe Road • • • Cleveland, Ohio

BIRMINGHAM • BOSTON • BUFFALO • CHICAGO • CINCINNATI • DETROIT • GREENVILLE, S. C. HOUSTON, TEX. • LOS ANGELES • MINNEAPOLIS • NEW YORK • PHILADELPHIA • PITTSBURGH PORTLAND, ORE. • ST. LOUIS • SAN FRANCISCO • SYRACUSE, N. Y. • and other Principal Cities

RELIANCE A-C D-C MOTORS

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending March 7, 1942

STOCKS

	High	Low	Last
A. P. W.	1⅜	1⅜	1⅜
Armstrong Cork Co.	23½	23	23½
Celotex Corp.	7¾	7	7
Celotex Corp., pf.	68	67	68
Certain-Teed Products Corp.	2	2	2
Certain-Teed Products Corp., pf.	28¾	25	25
Champion Paper & Fibre Co.	16¾	16½	16½
Champion Paper & Fibre Co., pf.	99½	99¼	99½
Congoleum-Nairn Co.	15¼	14⅞	14⅞
Container Corp. of America	12¾	12	12½
Continental-Diamond Fibre Co.	8	7¾	7¾
Crown-Zellerbach Co.	11½	11⅜	11⅜
Crown-Zellerbach Co., pf.	80¼	79½	79¾
Flintkote Co.	10⅜	9⅞	9⅞
Robert Gair	2	1⅞	1⅞
Robert Gair, pf.	9¾	9¾	9¾
International Paper	15⅜	14	14½
International Paper, pf.	57¾	54½	55½
Johns-Manville Corp.	62½	57½	57½
Johns-Manville Corp., pf.	125¼	124	124
Kimberly Clark Corp.	28	28	28
MacAndrews & Forbes	20½	20	20
MacAndrews & Forbes, pf.	....	....	....
Masonite Corp.	27¼	26¼	27
Mead Corp.	6½	6⅜	6⅜
Mead Corp., pf.	68	68	68
Paraffine Companies, Inc.	24	22	22
Paraffine Companies, Inc., pf.	90	90	90
Rayonier, Inc.	10	9	9
Rayonier, Inc., pf.	25¼	24½	24½
Ruberoid Co.	16¾	16	16½
Scott Paper Co.	31⅞	31½	31½
Scott Paper Co., pf.	114⅞	114⅛	114⅛
Sutherland Paper Co.	19¾	19¼	19⅜
Union Bag & Paper Corp.	8⅝	8	8⅛
United Paperboard Co.	3⅜	3¼	3¼
U. S. Gypsum Co.	48¼	45	45
U. S. Gypsum Co., pf.	170½	167½	170½
West Virginia Pulp & Paper Co.	17	16	16½

BONDS

Abitibi Pulp & Paper Co. 5s '53	58½	56⅛	57½
Celotex Corp. 4½s '47	96½	95½	95½
Certain-Teed Products Corp. 5½s '48	85¼	84¼	85¼
Champion Paper & Fibre Co. 4¾s '50	104⅝	104⅝	104⅝
Champion Paper & Fibre Co. 4¾s '50	103½	102½	103½
International Paper Co. 6s '55	105½	105	105
International Paper Co. 5s '47	104⅞	104½	104¾
Mead Corp. 4½s '55	105¾	105½	105½

New York Curb Exchange

High, Low and Last for Week Ending March 7, 1942

STOCKS

	High	Low	Last
American Box Board Co.	4½	4½	4½
Brown Co., pf.	....	....	....
Great Northern Paper Co.	33½	33½	33½
Hummel-Ross Fibre Corp.	....	....	....
National Container Corp.	9	9	9
St. Regis Paper Co.	2¼	1⅞	2
St. Regis Paper Co., pf.	114	112	112
Taggart Corp.	3½	3	3⅛

BONDS

American Writing Paper Co. 6s '61	80	80	80

Bathurst Nets $918,447

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., March 9, 1942—Operations of Bathurst Power and Paper Company for 1941 resulted in a net profit of $918,447, after provision of $612,298 for Dominion income and excess profits taxes, according to a preliminary report given in a circular accompanying current dividend cheques, which is signed by R. L. Weldon, president and H. J. Webb, vice-president and secretary-treasurer. Taking into account the participating feature, this net is equal to $2.17 per share on the Class A, 17c per share on the Class B. This net compares with $786,743 for 1940, when taxes absorbed $504,418. Net for 1940 was equal to $1.97 per Class A share, nil per Class B.

Abitibi Bondholders Want Payment

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., March 9, 1942—Montreal Trust Co. has made application to the Ontario courts for payment of a further 10% on the 5% bonds of Abitibi Power and Paper Company. The action is in behalf of the bondholders' protective committee, of which H. J. Symington, K.C., is chairman. The request is for 10% to apply on principal of the bonds and not on interest and it is expected that it will, if and when paid, not be subject to income tax.

This payment will follow 13% paid October 15, 1941, making a total of 23% principal payment which bondholders will then have received. It will amount to $11.1 millions repaid on principal, $6.3 millions last year and $4.8 millions in the latest request. Bonds outstanding will be reduced to $37.2 millions following the proposed payment.

It is understood the request for another payment on principal has nothing to do with the liquidator's appeal against the bondholders' sale order. Judgment on this appeal has been reserved by the Ontario Court of Appeals.

Decision to ask for repayments on principal rather than on unpaid interest is claimed to be due to the possibility that final settlement would find insufficient assets to repay bondholders in full, plus unpaid interest. Thus if early payment had been on account of interest, bondholders would have been required to pay income taxes on sums which were not actually income at all, but principal payments. The unpaid interest remains undisturbed and interest on this interest can continue to accumulate. If and when this interest is paid, it will be, presumably, subject to taxation.

It is understood that the 10% payment will use up most of the current large operating profits of Abitibi and is the maximum amount which the Foreign Exchange Control Board would permit to be paid at this time. Substantial amounts of Abitibi bonds are held in other countries, requiring foreign exchange for payment.

Eastern Corp. Nets $835,033

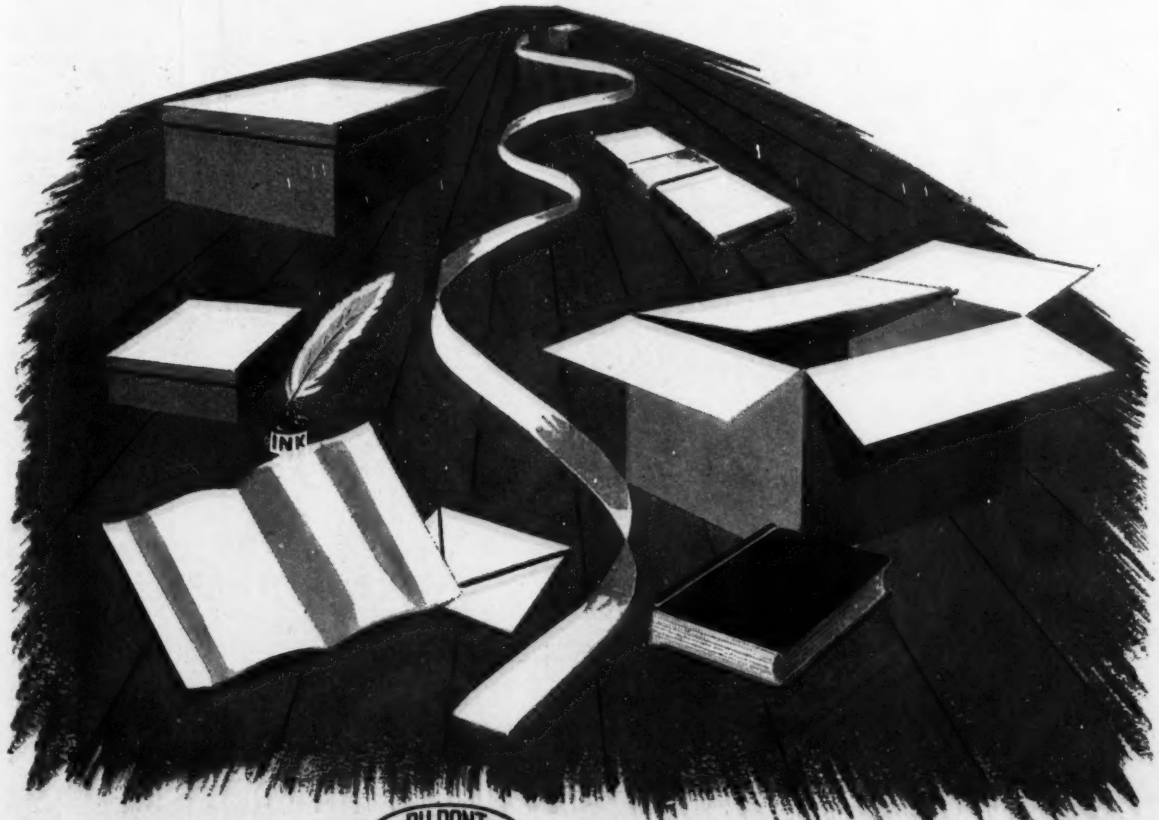
The Eastern Corporation for 1941, reports a net profit of $835,033, equal, after preferred dividend requirements, to $4.02 each on 200,444 common shares, compared with $195,453, earned in 1940. Reduction in the long-term debt amounted to $286,800. On or before March 31, 1942, the company is required to pay $125,000 on its five-year 4% notes and deposit $178,892 for the retirement of prior preferred stock. Net working capital at close of last year amounted to $2,949,377.

Fraser Companies Earnings High

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., March 9, 1942—The financial statement of Fraser Companies, Limited, of Edmundston, N. B., for 1941, shows a wide increase—nearly $2 million—in operating earnings as a result of

Du Pont dyes for paper



E. I. DU PONT DE NEMOURS & CO. (INC.), DU PONT DYESTUFFS ORGANIC CHEMICALS DEPT., DYESTUFFS DIVISION, WILMINGTON, DELAWARE

the year's marked expansion in mill operations. At $5,116,591 operating earnings reached a new high level, as compared with $3,221,641 for 1940, $1,768,-529 for 1939. After interest, depreciation and depletion, and after application of $438,135 in reduction of inventories, profit before provision for income and excess profits was $2,432,948 as compared with $679,-937 for 1940, $208,638 deficit in 1939. In the directors' report, signed by President Aubrey Crabtree, it is stated that pending a decision by the Board of Referees on the claims of Fraser and Restigouches companies for adjustment of standard profits it is impossible to say what the actual excess profits tax liability will be. In the meantime, a provision for such taxes of $2,000,000 has been set up as a current liability, which sum has been transferred from surplus account rather than from income and expenditure account.

Rayonier Nets $927,083

Rayonier, Inc. for the quarter of January 31, reports a consolidated net profit of $927,083, equal after preferred dividends to 63 cents each on 963,871 common shares outstanding, against $935,760, or 65 cents a share, in preceding quarter and $892,844, or 60 cents a share, for quarter ended January 31, 1941. Nine months to January 31: Consolidated net profit $2,697,826, or $1.82 a common share, compared with $3,031,953, or $2.17 a share, for the corresponding period of previous year. Edward M. Mills, president, attributed the decrease in nine months' earnings to increased Federal taxes on income. Provision for such taxes for the nine months totaled $3,995,665, compared with $2,655,279 for nine months of preceding fiscal year. During the nine months ended with January, 1942, the company prepaid a total of $1,500,000 for its long-term bank loans, reducing the amount outstanding at close of period to $3,500,000.

Oswego Plant Busy on Defense Work

OSWEGO, N. Y., March 9, 1942—The branch of the St. Regis Paper Company here is confining a large part of its production to defense work with indications that all equipment will be running full blast for some time. The concern is devoting much of its output to supplying the needs of the army and navy, the bag division manufacturing heavy duty multi-wall paper bags for the shipment of construction materials to army camps and to munition plants. The concern is also producing filling equipment for these bags as well as making bags for food products to be shipped to the armed forces. In addition to the production of articles made of paper, the company is also devoting a large part of the facilities of its machine division here to the manufacture of parts for the use of both land and naval forces.

A. P. W. Co. Nets $76,734

The A. P. W. Paper Company for the period from July 1, 1941 to January 10, 1942, reports a net profit of $76,734, after interest on funded debt, including interest on $760,612 par value twenty-five-year 6% convertible notes assented and after inventory reserve and reserve for contingencies. For the similar period of the preceding fiscal year the company reported a loss of $75,483, after interest on funded debt, notes and acceptances.

Champion Earns $3.41

The Champion Paper and Fibre Company reports for the forty weeks ended on February 1, a net profit of $2,291,746 after Federal income and excess profits taxes and other charges. This was equivalent to $3.41 each on 550,500 shares of common stock, after dividend requirements on the 6% preferred stock, and compared with a net profit of $1,829,634, or $2.59 each on 550,700 shares of common stock in the forty weeks ended on Feb. 2, 1941.

For the twelve weeks ended on February 1 net income amounted to $839,746, equal to $1.30 a common share, compared with $652,887, or 97 cents a share, in the twelve weeks the year before.

Gair Co. Votes Dividend

At a meeting of the Board of Directors of Robert Gair Company, Inc., held February 26, 1942, a quarterly dividend of 30c per share in respect of the first quarter of the year 1942 was declared on the preferred stock of the par value of $20 per share of the company, payable April 1, 1942 to stockholders of record at the close of business on March 17, 1942, without the closing of the transfer books.

At the same meeting, the Board of Directors declared the full 6% interest on Robert Gair Company, Inc., income notes 1972's, payable April 1, 1942 to the holders of record at the close of business March 31, 1942.

Crown Zellerbach Nets $2.36

The Crown Zellerbach Corporation for the nine months to January 31, reports a consolidated net profit of $7,332,212, equal, after preferred dividend payments, to $2.36 each on 2,261,199 common shares, compared with $6,448,554 or $1.97 a common share in corresponding period of the previous fiscal year; net sales, $64,274,612, agains: $50,991,759. Three months to January 31: net profit, $2,856,253, against $2,224,-233 in preceding quarter and $2,118,689 in quarter ended on January 31, 1941.

Dexter Mill Damaged by Fire

DEXTER, N. Y., Feb. 28 — Damage estimated at about $50,000 was done to the Dexter Sulphite, Pulp & Paper Co. by fire early this week which for a time threatened complete destruction of the property. One of the buildings destroyed was operated as a grist mill and the other as a powerhouse. The origin of the blaze could not be learned and it is probable that the powerhouse will be rebuilt.

St. Helens Nets $481,651

The St. Helens Pulp and Paper Company for 1941, reports a net income of $481,651 or $2.41 each on 199,934 capital shares, against $414,059 or $2.07 a share in 1940.

Glatfelter Makes Good Report

The P. H. Glatfelter Co. reports for 1941, a net income after all charges, including Federal, State, and municipal taxes, of $271,820.19, against $276,088.81 in 1940.

LEADING PAPER MILLS REPORT

on Monsanto Sodium Aluminate for Sizing at controlled pHs

Many leading mills, manufacturing many different types of paper, have found that by using Monsanto Sodium Aluminate in conjunction with alum they are able to get satisfactory sizing at *any* desirable pH.

What this has meant in terms of better machine conditions, more efficient production and better paper is revealed in the summaries of their experience listed at the left.

☆ ☆ ☆

THE EXPLANATION: Sodium Aluminate is an alkaline source of alumina as contrasted with alum, an acid source. By varying the proportion of sodium aluminate and alum used in the rosin sizing process it is possible to obtain any required amount of alumina at any desired pH. This permits greater flexibility in the sizing process and is a means of realizing the many benefits obtained by sizing paper at higher pHs.

☆ ☆ ☆

SPECIFICATIONS: Monsanto Sodium Aluminate contains a minimum of *90%* Sodium Aluminate, yet it remains *stable* in *6%* water solutions for several weeks.

This exceptional stability keeps scale formation in dissolving tanks and pipe lines at a minimum.

Readily soluble in water, Monsanto Sodium Aluminate is low in insolubles and has the same iron content as iron-free alum on the alumina basis.

☆ ☆ ☆

THE COST: Many cases are on record where the use of Monsanto Sodium Aluminate has resulted in a substantial net saving over the cost of the material. Compared with other alkalis sometimes used with alum for pH control, it is usually more economical in first cost and invariably its use results in greater benefits.

For full details and experienced technical service, inquire: MONSANTO CHEMICAL COMPANY, Merrimac Division, Everett Station, Boston, Massachusetts.

IMPROVED SIZING

Manufacturers of hard-sized, kraft paper report:

1. Average pH without Sodium Aluminate 4.8 — average pH with Sodium Aluminate 5.5.
2. Average amount of Sodium Aluminate used 0.5%.
3. Average percent reduction in alum furnished 25.0%.
4. A definite increase in sizing due to ability to supply sufficient alumina and maintain optimum pH.
5. Reduction in degradation of fibres by raising pH.
6. A more efficient setting of color.

MORE PERMANENT PAPER

Manufacturers of high grade rag and sulfite papers—including bond, ledger and onion skin—report:

1. Average pH without Sodium Aluminate 4.5 — average pH with Sodium Aluminate 5.7.
2. Average amount of alum used 1.75%.
3. Average amount of Sodium Aluminate used 0.6%.
4. From no effect to marked improvement on sizing.
5. Reduction in sulfate content of the paper.
6. pH of the paper raised as high as 7, giving increased resistance to aging.

BETTER MACHINE CONDITIONS

Manufacturers of groundwood specialty papers report:

1. Average pH without sodium aluminate 4.3 — average pH with sodium aluminate 5.4.
2. Average amount of sodium aluminate used 0.3%.
3. Average percent reduction in alum 25.0%.
4. Elimination of sticking of wet web.
5. Better machine efficiency and improved sheet formation.

"E" for Excellence...the pennant denoting the highest service accomplishments in the United States Navy...flies with the Naval Ordnance flag over Monsanto. In the words of the Secretary of the Navy, this award has been made to Monsanto "in recognition of your outstanding efforts in the production of ordnance materiel vital to our national defense."

MONSANTO CHEMICALS

SERVING INDUSTRY...WHICH SERVES MANKIND

CONSTRUCTION NEWS

Rothschild, Wis.—The Marathon Paper Mills Company, manufacturer of manila, bond and other paper stocks, box board, waxed and processed papers, etc., has plans maturing for new one-story addition to mill, to be used for expansion in chemical department, where considerable increased capacity will be carried out. No estimate of cost announced. Erection contract is scheduled to be awarded at early date, with work to be carried out during the spring.

Chicago, Ill.—Atlas-Boxmakers, Inc., 2555 West Diversey boulevard, manufacturer of corrugated boxes and containers, has work under way on new one-story plant at Cicero avenue and Division street, to be occupied by its Crescent Set Up Division, now located in a one and two-story building at 1238-40 North Kostner avenue. It is expected to have the new structure ready for occupancy during summer, when present plant will be removed to new location, and additional equipment and facilities provided for increased capacity. No estimate of cost has been announced. Present building on North Kostner avenue, noted, is occupied under lease, and has now been sold to the Universal Form Clamp Company, 961 West Montana street, Chicago, which will occupy as soon as property is vacated.

San Jose, Calif.—Zellerbach Paper Company, 534 Battery street, San Francisco, Calif., commercial and other paper products, wrapping stocks, etc., plans new one-story building at San Jose, for branch storage and distributing plant, including local headquarters. Cost reported over $40,000. Work will be placed under way soon.

Merrill, Wis.—The Ward Paper Company, manufacturer of sulphite paper products, is said to be arranging for early award of building contract for new one-story addition to mill, to be used for pulp storage and allied service, recently referred to in these columns. No estimate of cost announced. George E. Foster, Jr., 326 Third street, Wausau, Wis., is architect.

Chicago, Ill.—The United Wall Paper Factories, Inc., 330 West Fillmore street, manufacturer of wall paper stocks, has begun construction of new addition to local mill at Sixty-sixth and Major streets, recently referred to in these columns, consisting of a one-story structure, reported to cost approximately $60,000, with equipment. A. A. Rose Construction Company, 327 South LaSalle street, Chicago, has general erection contract.

Detroit, Mich. — The Hinde & Dauch Paper Company, Sandusky, Ohio, manufacturer of corrugated boxes and containers, is operating its branch plant on West Chicago boulevard, Detroit, on a capacity schedule, with basis of 18 hours per day. The plant is giving employment to a maximum working force, now including the largest quota of girls and women in history of company, due to the number of men which have temporarily left employment at the plant to join the army or navy. Plant is now engaging on a basis of about 70 per cent of output for war service, including large and small corrugated containers for shipment of airplane parts, shells, bomb fuses and other ammunition, drug and medical supplies. It is expected that in the near future production will be on a 100 per cent schedule for this purpose for the Government. Branch plants of the company in other parts of the country are similarly engaged with a heavy volume of war orders at the present time.

New York, N. Y.—J. G. Marchant, 416 West 33rd street, manufacturer of greeting cards, etc., has leased a floor in building at 653-59 Eleventh avenue, totaling about 10,000 square feet of floor space, and will occupy for a new converting plant. Present works will be removed to new location and capacity increased.

Winnipeg, Man.—Fire recently damaged a portion of mill of L. R. Key Fiber Company, Dublin avenue, manufacturer of fiber products, with loss reported close to $30,000, including equipment. Property is occupied under lease. It is proposed to rebuild.

New Companies

Chicago, Ill.—The Hoyler Envelope Company has been incorporated with capital of 1000 shares of stock, no par value, to manufacture commercial envelopes and kindred paper products. New company will take over and succeed to the organization of same name, with local plant at 501 South Jefferson street.

Manchester, Conn.—The Lowe Paper Company of Connecticut, Inc., has been incorporated with capital of $50,000, to manufacture and deal in paper products of various kinds. The incorporators include John G. Lowe and Starke B. Ferriss, both of Manchester; and James A. Stabile, Jamaica, L. I., N. Y.

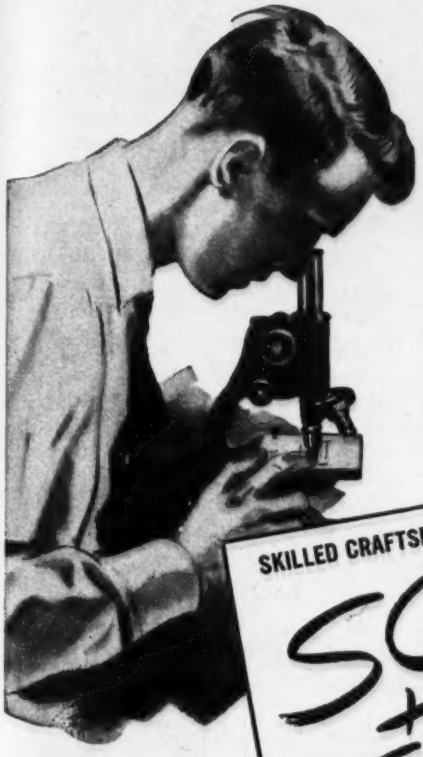
Boston Paper Men To Hear Carveth Wells

BOSTON, Mass., March 9, 1942—Carveth Wells, distinguished explorer, engineer and author, is to be the speaker at the Fifty-Sixth anniversary banquet of the Boston Paper Trade Association, to be held Thursday evening, March 19, at the Algonquin Club. Mr. Wells will give a new timely discussion, with pictures, of "The Battle for Tin and Rubber."

His colored film includes moving pictures of Honolulu, Japan, Shanghai, Hongkong, Singapore, Kuala Lumpur (Capital of the Federated Malay States), scenes along the railroad through the heart of the Malay jungle, Kelantan (now in Japanese hands); the Siamese border in northern Malaya. Kota Bharu (now in Japanese hands); The Pahang Jungle including magnificent animal pictures; Kuala Lipis across the Malay Peninsula by road to Kuala Kubu; Tin Mines; Rubber Estates; Kuala Kangsar (capital of Perak); Alor Star (capital of Kedah, now in Japanese hands); Jungle Dwarfs in the depths of the jungle; Penang (now in Japanese hands).

THIS KENWOOD FORMULA

determines every step from Fleece to Felt



SKILLED CRAFTSMANSHIP

SC + SC

SCIENTIFIC CONTROL

►Woven into every Kenwood Felt is something the eye cannot see, the hand cannot feel. It is the superb craftsmanship that has been the pride of F. C. Huyck & Sons for 71 years. But hand in hand with this craftsmanship, through every manufacturing step, goes science—the factor that guides human skill and machine magic. That is why the Kenwood Formula "SC plus SC"—*skilled craftsmanship* plus *scientific control*—is the symbol and the secret of the uniform high quality of Kenwood Felts.

►First our field engineers get the facts. Then our laboratory technicians design a felt to give the best possible performance on a specific machine in making a specific type of paper. The making of this felt is then checked every step of the way from the selection and blending of the wools to the final exacting tests of the finished product.

►Today paper machines in mills all over America are running at higher speeds, making better paper at lower costs, because Huyck's *skilled craftsmanship* plus *scientific control* has resulted in greater felt efficiency. Are you using all the facilities of this organization? Its services are yours for the asking.

F. C. HUYCK & SONS

Established 1870

KENWOOD FELTS • ALBANY, N. Y.

KENWOOD WOOL PRODUCTS

ADVISED TO MODERNIZE MILLS

(Continued from page 7)

The Board, after defining papeteries as "stationery packed in boxes, cartons or containers, for sale at retail," said.—

Gift or Christmas papeteries are to be manufactured in cartons containing at least 75 per cent of writing paper and envelopes and not more than 25 per cent false bottom and padding. No such stationery is to be boxed in individual containers unless the cost is at least 60 cents wholesale.

Manufacturers are allowed to produce "staple papeteries or boxed stationery" only in boxes or cartons having no false bottoms, padding, flanges or false lids, and containing not less than 90 per cent writing paper and envelopes by cubic measurement.

The manufacture is prohibited entirely of writing tablets using wood board exceeding .035 in caliper; examination pads, typewriter pads, scribbling pads, school ruled pads and all other such pads using backing board exceeding .025 in caliper; papeteries of any kind using bulge, double side or double top boxes.

Industry's Wartime Work is Praised

Sir Herbert Jepp, of Melbourne, Australia, managing director of the Australian Paper Manufacturing Company, who has been visiting Montreal, declared in an interview that the Canadian pulp and paper industry's Wartime Machine Shop Board was "a magnificent contribution to the war effort." Sir Herbert said he attended the recent convention of the Canadian Pulp and Paper Association and was able to investigate the work of the Wartime Machine Shop Board of the pulp and paper industry. "It is utilizing the spare time of the maintenance machine shops of the pulp and paper industry and also a number in the mining industry for the production of many essential requirements for ships, guns and planes," he said.

"It is an inspiring example of the way in which organized industry can assist the war effort. I am hopeful that the pulp and paper industry in the United States will shortly put into operation a similar scheme."

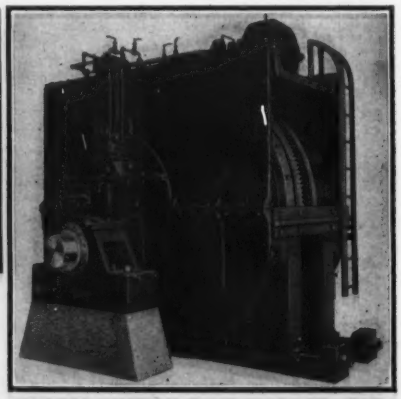
Sir Herbert, who has been visiting the United States on a special mission for the Australian Government, said his visit to Montreal was connected with some discussions with George Tomlinson, technical director of the Howard Smith Paper Company, with whom he had kept in touch for some years, on technical developments in the pulp and paper industry.

Charles Vining Returns to Montreal

At the request of the Newsprint Association of Canada, arrangements have been made for Charles Vining, assistant to Chairman Donald Gordon of the Wartime Prices and Trade Board, to return temporarily to his former position as president of the association in Montreal.

Woodpulp for Explosives

According to the Financial Times, of Montreal, wood pulp has largely replaced the more expensive cotton linters in the manufacture of cordite in Canada, and furthermore chemical pulps in considerable quantities are being exported to Britain for the making of propellants there.



The Roberts Grinder grinds more pulp. This high-speed, continuous grinder is manufacturing up to 50 tons of groundwood pulp every 24 hours in American and Canadian newsprint mills. Production is limited by the maximum speed limits of the stone, the power input and the required freeness of the pulp. There is no downtime. The wood is fed to the stone continuously. No wonder that the Roberts Grinder grinds more pulp —in less time.

It also manufactures groundwood at lower cost. Power and labor savings are important economy features. Less power is needed per ton of pulp. Savings in labor run as high as 70%. On one installation, one operator loads two grinders with approximately 100 cords of wood every twenty four hours. Simplified design and rugged construction have reduced maintenance and eliminated service interruptions. There is less waste, pulp quality is improved. Operating advantages save time and money. One mill superintendent has said "The saving that is apparent in our mill, where we make about 110 tons of groundwood per day is roughly about $50,000 per year . . ."

Only slight mill change is necessary to install the Roberts Grinder. It replaces 3 to 4 pocket grinders yet takes little more floor space than a single 3 pocket grinder, requires no greater head-room, no auxiliary equipment. This new continuous grinder makes a long jump ahead in the manufacture of groundwood. Highspeed grinding is a demonstrated success. It is a faster and more profitable way to grind pulp for paper. Let us give you all of the details and comparative performance figures.

ROBERTS Continuous GRINDER

Canadian Sales—F. W. ROBERTS MANUFACTURING COMPANY OF CANADA, Limited, Niagara Falls, Ont.

THE APPLETON MACHINE COMPANY
APPLETON WISCONSIN

Delaware TAPPI Adventures in Research

The Delaware Valley Section of the Technical Association of the Pulp and Paper Industry held its regular meeting at the Philadelphia Engineers Club, March 6, 1942 with E. J. Albert presiding.

Phillips Thomas of the Westinghouse Research Laboratories gave a talk on some of the things developed by engineers over the past few years, the title being, "Adventures in Research." Some of the developments have found commercial application while others may never be of practical use. The greatest interest was shown in equipment designed by Dr. Thomas to produce vortex rings or air rings similar to smoke rings, but of much greater intensity. Using this equipment, candles were blown out from a distance of about 20 feet. All other demonstrations were presented in a most interesting manner and included a photoelectric device for locating and extinguishing fires, landing markers for seadromes controlled by radio, ultraviolet light and fluorescence, high pressure and intensity mercury lights which gave only visible radiations, cadmium and sodium vapor lights, and a simplified voltage regulator. The entire lecture was ably presented and a clear explanation of principles was given.

Among those present were: Edw. J. Albert, R. M. Bates, D. E. Bates, S. W. Blanchard, S. G. Briscoe, Earl Bosch, Alan R. Boyd, Samuel M. Bratton, Price Brooks, W. E. Brow, C. M. Connor, A. M. Cooper, J. E. Conway, R. F. Fox, J. D. Davis, George H. Detwiler, A. G. Frankenhoff, Robert Gavin, J. F. Good, H. L. Goudy, Wm. J. Marshall, Alex. McInnes, W. P. Quinn, D. S. Raub, A. W. Redlin, Toney Sciarretta, John R. Shallcross, Chas. A. Shubert, Oliver S. Sprout, H. M. Spurlin, R. Tutt, Jr., John N. Tuttle, R. H. Underdown, G. C. Walton, A. E. Waugh, A. H. Webber, H. L. Winslow, J. W. Voller, and Edmund A. Yerger.

New York Paper Men to Celebrate

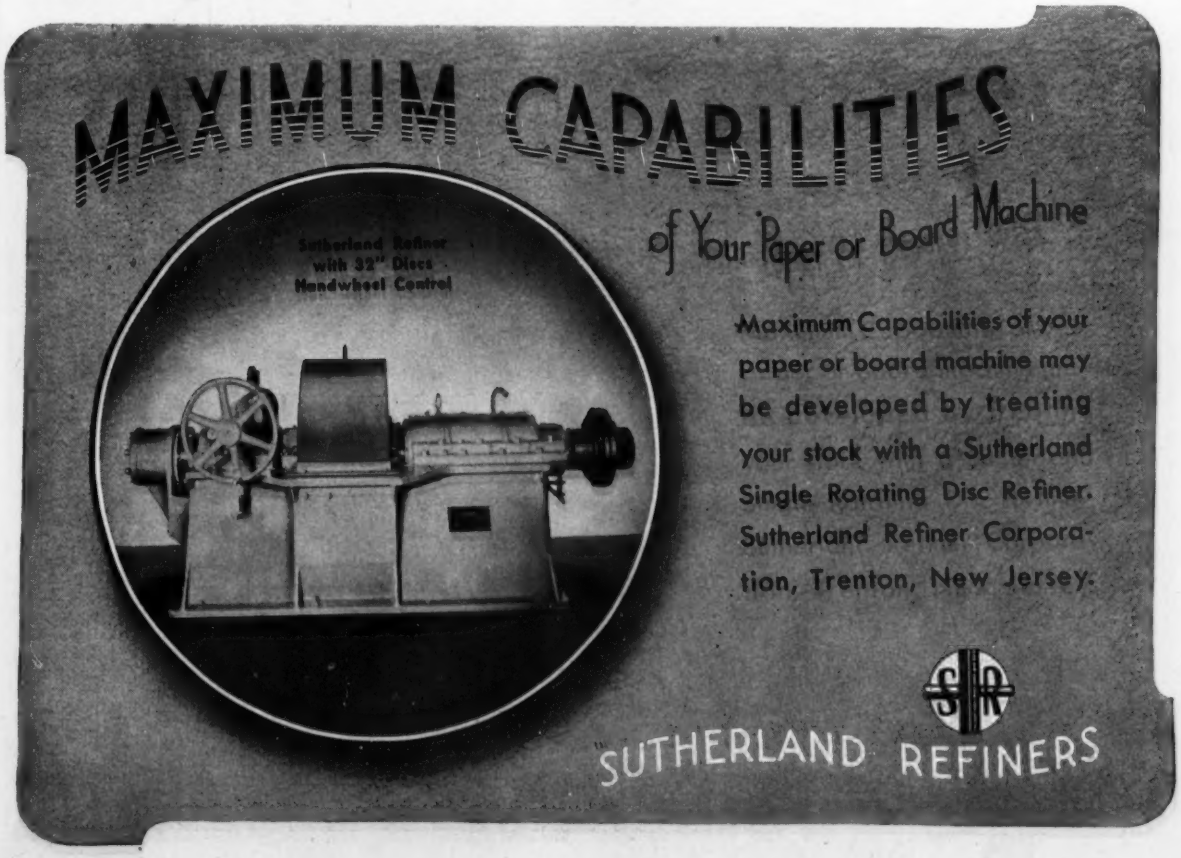
The Paper Association of New York City will celebrate its fortieth anniversary with a formal dinner and entertainment in the Grand Ball Room of The Waldorf-Astoria on Tuesday evening, April 14. Members are privileged to invite paper trade friends and an attendance of 500 is anticipated.

President David S. Landau has appointed the following committees: Samuel G. Garner, chairman; Fred P. Appleton, Eugene F. Brennan, J. O. Bulkley, H. W. Doremus, P. W. Eason, Thomas Goulard, Gustave C. Indruk, William E. Madden, Oswald F. Marquardt, Arthur W. Pohlman, Leon Pomerance, Paul K. Roth, Fred Schlosser and C. H. Schorske.

High Speed Printing of Book Paper

The next meeting of the Michigan Division of the American Pulp and Paper Mill Superintendents Association will be held on Thursday, March 19, at the Park-American Hotel in Kalamazoo. Dinner at 6:30 P. M.

Robert Ross, director of paper purchases for R. R. Donnelly & Sons of Chicago, will speak on "The Present Aspects of High Speed Printing of Book Paper".


MAXIMUM CAPABILITIES
of Your Paper or Board Machine
Sutherland Refiner with 32" Discs Handwheel Control
Maximum Capabilities of your paper or board machine may be developed by treating your stock with a Sutherland Single Rotating Disc Refiner. Sutherland Refiner Corporation, Trenton, New Jersey.
SR
SUTHERLAND REFINERS

Government Paper Bids and Awards

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 11, 1942—The Government Printing Office has received the following bids for 50,000 pounds of 22½ x 28½ buff wood bristol board: Graham Paper Company, 6.65 cents; Stanford Paper Company, 5.5 cents; Frank Parsons Paper Company, 5.5 cents; Barton, Duer & Koch Paper Company, 5.75 cents; Old Dominion Paper Company, 5.494 cents; Mudge Paper Company, 5.64 cents; and Whitaker Paper Company, 6.65 cents.

For 18,900 pounds of 34 x 44 white offset book paper: Stanford Paper Company, 7.8 cents; R. P. Andrews Paper Company, 8.4 cents; Mudge Paper Company, 9.28 cents; and Paper Corp. of U. S., 7.62 cents.

For 84,000 pounds of 26 x 32 offset book paper: R. P. Andrews Paper Company, 8.3 cents; Mudge Paper Company, 9.28 cents; Stanford Paper Company, 7.8 cents; Butler Company, 7.72 cents; Paper Corp. of U. S., 7.62 cents; Marquette Paper Company, 7.3 cents; and McIntosh Paper Company, 7.7 cents.

For 287,000 pounds of 32 x 42 white sulphite writing paper: Eastern Corporation, 7.27 cents; R. P. Andrews Paper Company, 7.19 cents; Whitaker Paper Company, 7.14 cents; Marquette Paper Company, 7.14 cents; Paper Corporation of U. S., 7.4 cents; Stanford Paper Company, 7.75 cents; and Cauthorne Paper Company, 7.5 cents.

For 160,000 pounds of white sulphite writing paper in 32 inch rolls: Eastern Corp., 7.03 cents; R. P. Andrews Paper Company, 6.79 cents; R. P. Andrews Paper Company, 6.79 cents; Whitaker Paper Company, 6.86 cents; Marquette Paper Company, 6.64 cents; Paper Corporation of U. S., 6.9 cents; and Stanford Paper Company, 7.5 cents.

For 44,455 pounds of 40 x 53 white offset book paper: Perkins-Goodwin Company, 7.53 cents; Paper Corporation of U. S., 7.62 cents; Whitaker Paper Company, 7.35 cents; Stanford Paper Company, 7.8 cents and Mudge Paper Company, 7.02 cents.

For 49,250 pounds of 38 x 48½ blue mimeograph paper: R. P. Andrews Paper Company, 8 cents; Marquette Paper Company, 7.75 cents; and Paper Corp. of U. S., 9.5 cents.

For 63,900 pounds of 23 x 36, 25% rag white bond paper: Walker Goulard Plehn Company, 13.84 cents; Whitaker Paper Company, 13.9 cents; Mudge Paper Company, 14.89 cents; and Barton, Duer & Koch Paper Company, 13.75 cents.

For 24,075 pounds of 75% rag, 21 x 32½ yellow ledger paper: Walker Goulard Plehn Company, 21.74 cents; Whitaker Paper Company, 23.15 cents; Mudge Paper Company, 22.34 cents; Stanford Paper Company, 22.3 cents; Barton, Duer & Koch Paper Company, 20.5 cents; and Resolute Paper Products Company, 21.4 cents.

For 75,395 pounds of 42 x 62 white sulphite writing paper: Whitaker Paper Company, 7.21 cents; R. P. Andrews Paper Company, 7.19 cents; Perkins-Goodwin Company, 7.12 cents; Marquette Paper Company, 7.14 cents; and Wilcox-Walter-Furlong Paper Company, 7.05 cents.

For 37,700 pounds of 32 x 42½ buff mimeograph paper: Marquette Paper Company, 7.75 cents; Paper Corp. of U. S., 9.25 cents; Frank Parsons Paper Company, 8.25 cents.

For 54,000 pounds of 8 x 10½ white sulphite bond paper: Eastern Corp., 7.76 cents; Bulkley, Dunton & Company, 10.2 cents less 2%; Stanford Paper Company, 8 cents; and Paper Corp., of U. S., 10.92 cents.

For 323,000 pounds of 31½ x 48 white sulphite writing paper: Coy, Hunt & Company, 7.45 cents; Whitaker Paper Company, 7.11 cents; R. P. Andrews Paper Company, 7.09 cents (175,000 pounds only); Cauthorne Paper Company, Inc., 7.5 cents; Stanford Paper Company, 7.75 cents; Paper Corp. of U. S., 7.947 cents; Eastern Corporation, 7.27 cents; and Marquette Paper Company, 7.14 cents (250,000 pounds only).

For 717,500 pounds of 32 x 42 white sulphite writing paper: Stanford Paper Company, 7.75 cents; Cauthorne Paper Company, 7.5 cents; Whitaker Paper Company, 7.11 cents; Marquette Paper Company, 7.14 cents (250,000 pounds only); Eastern Corp., 7.27 cents; and R. P. Andrews Paper Company, 7.09 cents.

For 30,000 pounds of 32½ x 42 50% rag, buff eldegre paper: Walker Goulard Plehn Company, 16.69 cents; Baldwin Paper Company, 18.75 cents; Bradner Smith & Company, 17.75 cents; Collins Mfg. Company, 17.72 cents; and Mudge Paper Company, 17.65 cents.

For 6,000 pounds of 21 x 32, 75% rag, blue ledger paper: Walker Goulard Plehn Company, 22.89 cents; Baldwin Paper Company, 22 cents; Willcox Walter Furlong Company, 21 cents; Collins Mfg. Company, 23.25 cents; Mudge Paper Company, 23.15 cents; Barton, Duer & Koch Paper Company, 21 cents; Baxter Paper Company, 22.8 cents; and R. P. Andrews Paper Company, 22.55 cents.

Duty on Casein

WASHINGTON, D. C., March 11, 1942—From February 2 to June 30 of this year inclusive, the duty on casein (other than rennet casein) for use in Canadian manufactures, was reduced to 5% ad valorem on imports from all foreign countries (free from the British Empire) under a new tariff item, according to a report to the Department of Commerce.

The usual duties on casein are 12½% ad valorem from Australia, New Zealand and the United Kingdom; 25% plus 2½ cents per pound from the United States and other favored nations and 27½% plus 3 cents per pound from other foreign countries.

LaMOTTE POMEROY SULFIDE TESTING SET

This outfit was developed for the accurate determination of Total Sulfides, Dissolved Sulfides, and Free Hydrogen Sulfide in Air and Gases. The methods of testing employed are those of Dr. Richard Pomeroy, with whose cooperation the apparatus has been developed. Outfit comes complete with necessary reagents, pipettes, glassware and full instructions.

Write for further information.

LaMOTTE CHEMICAL PRODUCTS CO.
Dept. PT Towson, Baltimore, Md.

Steel Strapping

Steel strapping is interpreted by authorities as "operating supplies" and as such carries a rating of A-10 under Preference Rating Order P-100. Because this order forbids the application of the rating to "non-ferrous material to be used as packaging supplies," there has been some misundertanding to the effect that steel strapping could no longer be obtained . This is not so, as steel strapping is "FERROUS" material and therefore is eligible to receive an A-10 rating on Preference Rating Order P-100.

While steel is a critical item, there is still sufficient steel available to supply essential needs of industry . . . and especially where no conservation of needed material results from the replacement of steel by substitutes. This is particularly true of steel strapping which permits the use of lighter weight boxes, makes possible the bundling and skid-handling of hundreds of products which would otherwise be packed in heavier and more expensive containers . . . thus adding to freight charges, stowage and handling problems.

Then too, safe delivery to destination of war and civilian products becomes increasingly important as costly and perhaps fatal delays caused by damage or loss enroute can seriously handicap the all out Victory effort.

Government authorities recognize the value of steel strapping in assuring damage-free arrival of shipments and therefore include strapping as an essential item in their own packing specifications.

Sack Price Agreements

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 11, 1942—Price Administrator, Leon Henderson has stated here that paper shipping sacks are intended to be covered by the individual price agreements made by manufacturers of converted paper products although they are not mentioned specifically.

The agreements were issued February 20 of this year but since that time some manufacturers have raised the question of whether paper shipping sacks are affected. Mr. Henderson declared that this item should be inserted in the agreements with manufacturers signifying their willingness to cooperate with OPA by making a check mark in the proper column.

THESE two tanks in the plant of Carnegie-Illinois Steel Corp., Duquesne, Pa., were lined with two courses of acid-proof brick laid entirely in Penchlor Acid-Proof Cement.* They are used for pickling steel bars where the mechanical as well as the chemical action is especially severe.

Due to their large size—45′ x 5′ x 4′—both tanks were built with expansion joints in their lining. Inspection after a year's constant use showed absolutely no signs of permanent expansion of the lining. Both bricks and cement are still in perfect condition.

This is typical of the way Penchlor Acid-Proof Cement stands up in tough service. It is inert to all acids except hydrofluoric. It adheres strongly to such materials as brick, steel, glass, carbon, lead, and rubber. Quick-setting and self-hardening, it speeds up acid-proof construction.

For extremely abrasive conditions, or where thermal shocks are extreme, Asplit Cement* provides utmost durability and prevents spalling of bricks. It is a synthetic resin that far outlasts other types of acid-proof construction.

Penn Salt has been engaged for a great many years in the manufacture of acids and alkalies. We have naturally had considerable experience in the use of cements to resist corrosion, and are in a position to give technical advice. We will welcome inquiries on your problems.

*Fully protected by *existing* patents.

PENNSYLVANIA SALT MANUFACTURING COMPANY
Chemicals

1000 WIDENER BUILDING, PHILADELPHIA

NEW YORK · CHICAGO · ST. LOUIS · PITTSBURGH WYANDOTTE TACOMA

PAPER TRADE JOURNAL

Title Reg. U. S. Pat. Off.

Henry J. Berger
EDITOR

Vol. 114 March 12, 1942 No. 11

NEW ENGLAND SECTION. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

MORE EFFECTIVE CONTROL NEEDED

With the national income reported at the highest mark on record and a much higher peak expected for next year, fears of excessive inflation are increasing. All industries shared in the rise to $94,500,000,000 for last year, which was 22% higher than in 1940 and 13% higher than in 1929. A national income of at least $113,000,000,000 is expected for 1942. These figures from the Department of Commerce show that the percentage of the national income contributed by manufacturing was 20.95; trade, 11.9%; finance, 10.1%, agriculture, 6.8%; government, 6.4%. War expenditures in percentage of national income rose from 3.2% in 1940 to 12.5% in 1941. Wages and salaries totaled $61,300,000,000 and were about 25% higher than in 1940.

The unparalleled prosperity of the nation thus creates increasing anxiety at the prospect of controlling undue inflation. Increasingly, it appears, opinion in the United States manifests a conviction that, not only in the field of price control but in others as well, our Canadian neighbors, repeatedly revising procedures in the light of experience, are learning practical lessons that we can profit by in the organization of our own war effort, alongside theirs, states the Guaranty Trust Company of New York in the last issue of *The Guaranty Survey*, its monthly review of business and financial conditions. "In view of the widely held belief in this country that our recently enacted price control law will have to be amended in order to function effectively," *The Survey* continues, "the manner in which Canada has undertaken to solve the vital problem of price stabilization is now of special interest here."

Continuing its comment on the flexibility of new controls, the article points out that, "No other feature of the Canadian war-time regulation of the national economy, perhaps, is so widely commended by competent observers within and without the Dominion as is the new venture in comprehensive price control. This pioneering measure evidences recognition of the inevitable lameness of any general attempt to control commodity prices directly if changes in pertinent labor costs are left unrestricted, as they are now in the United States. A notable characteristic of the scheme as a whole, moreover, is the primary reliance of the control agency on the voluntary cooperation of producers, distributors and consumers, with powers of coercion reserved for minimum exercise in exceptional cases of recalcitrance. An emphatic preference for voluntary response to legislative or administrative requirements rather than for forced compliance, a common attribute of self-governing peoples, exemplifies those values the preservation of which is the central objective of the fighting democracies. Under the new system of regulation, general ceilings for Canadian wholesale and retail prices and for wages in virtually all industry have been established. Especially significant in contrast with the system now in effect in this country is the provision for changing from time to time the scales of payment for labor services, with the general objective of stabilizing real wages, or the relative purchasing power of workers' earnings, rather than nominal wage rates. Bonus payments to workers, computed on the basis of changes in the official cost-of-living index, are prescribed as an elastic component of aggregate labor earnings. Quarterly computations and corresponding adjustment of payments are to be made."

Continuing its discussion *The Survey* comments on the wholesome industrial relations as follows: "The importance of the new group of economic controls is not confined to the restraint of inflationary tendencies and the assurance of relatively stable distribution of the rewards for productive effort in a period of rapid and largely unforseeable changes. Of comparable significance is its prospective indirect influence in strengthening the bases of industrial peace, now more than ordinarily needed. The functioning of measures that assure an essentially automatic adjustment of workers' incomes, to reflect adequately the changing conditions, reduces or eliminates a primary cause of the labor disputes that have disrupted or threatened business operations during the emergency, both in Canada and the United States.

Commenting on meager initial preparedness for war, in which the United States was in a similar situation as Canada, the article says in part that, "Appreciation of the magnitude of the Dominion's progress toward the full employment of all its resources in making war, directly and indirectly, must take account of the country's slight preparation for fighting in 1939. In the early months of the conflict, apparently, a somewhat leisurely adaption of the nation's business to the new conditions was expected to suffice. Canada, like the United States, it then seemed,

would find its principal field of usefulness in supplying food, munitions, etc., to Great Britain and France. And a major concentration of effort on the Empire air-training program was planned. Not until the collapse of French resistance in 1940 were the Canadian people fully aroused, and nearly all the vast war-time transformation of the country's economy has been achieved since May of that year. The Dominion then undertook the largest task of war that has ever been attempted in so brief a time by a nation of its size. The population last year was approximately 11,600,000, not quite equal to that of the metropolitan area of New York City."

In conclusion *The Survey* states that, "A stupendous effort in the development and maintenance of a production front to provide war materials for the use of British and other Commonwealth forces, as well as for food for the United Kingdom, was evidently the measure of Canada's chief potential contribution to the common task. The training and sending abroad of men for service on the fighting fronts, however, were a major contribution of a virile people."

Now F. H. Knoll & Son, Inc.

F. H. Knoll, 11 W. 42nd street, New York, announces a change in name to F. H. Knoll & Son, Inc., paper manufacturers representatives. The present personnel, organization and address of the concern will remain as heretofore.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks, 1942		Corresponding Weeks, 1941	
January 24	104.7	January 25	87.4
January 31	103.2	February 1	86.4
February 7	104.1	February 8	88.6
February 14	103.1	February 15	89.3
February 21	103.1	February 22	90.4
February 28....(Prelim.)	*103.5*	March 1	90.5

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1941	85.6	89.7	92.2	96.0	98.7	99.3	94.2
1942	103.9	*103.5*	...	...	...	...	...

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1941	101.0	99.7	105.2	106.2	100.7	97.3
1942	...	...	...	...	...	...

COMPARATIVE YEARLY SUMMARIES

	1935	1936	1937	1938	1939	1940	1941	1942
Year to Date	66.5	76.3	89.4	65.8	78.1	87.8	87.4	*103.7*
Year Average	69.9	80.4	79.8	71.5	83.4	85.6	97.3	...

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS†

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1937	80	86	86	88	85	77	66	74	69	65	55	45	73
1938	54	60	61	57	58	56	57	66	66	70	65	59	61
1939	60	67	71	69	64	67	63	72	74	84	81	71	70
1940	71	70	69	70	76	79	72	74	72	79	77	71	73
1941	75	81	82	83	84	88	86	94	94	99	98	93	88
1942	102	*101*	..	..	..	..	..	..	..	..	..	..	..

Week ending Jan. 24, 1942—101
Week ending Jan. 31, 1942—101
Week ending Feb. 7, 1942—101
Week ending Feb. 14, 1942—101
Week ending Feb. 21, 1942—102
Week ending Feb. 28, 1942—*100*

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.

EXPORTERS
OF AMERICAN PULP

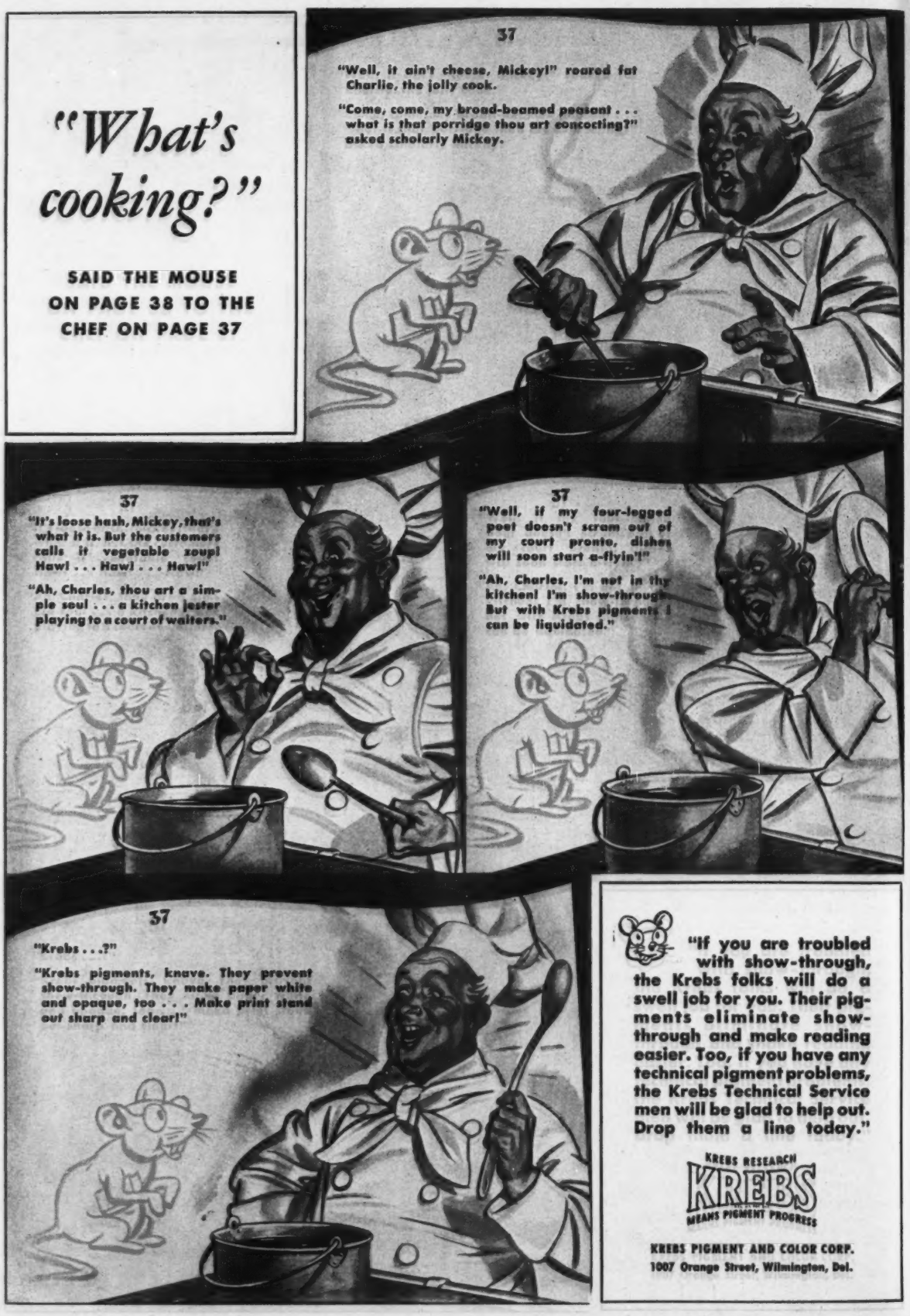
TO
BRITAIN
SOUTH AMERICA
AND ALL WORLD MARKETS

LYDDON
& COMPANY
(AMERICA) INC.

51 EAST 42ND STREET
NEW YORK CITY

"What's cooking?"

SAID THE MOUSE ON PAGE 38 TO THE CHEF ON PAGE 37


37
"Well, it ain't cheese, Mickey!" roared fat Charlie, the jolly cook.
"Come, come, my broad-beamed peasant . . . what is that porridge thou art concocting?" asked scholarly Mickey.
37
"It's loose hash, Mickey, that's what it is. But the customers calls it vegetable soup! Haw! . . . Haw! . . . Haw!"
"Ah, Charles, thou art a simple soul . . . a kitchen jester playing to a court of waiters."
37
"Well, if my four-legged pest doesn't scram out of my court pronto, dishes will soon start a-flyin'!"
"Ah, Charles, I'm not in thy kitchen! I'm show-through. But with Krebs pigments I can be liquidated."
37
"Krebs . . .?"
"Krebs pigments, knave. They prevent show-through. They make paper white and opaque, too . . . Make print stand out sharp and clear!"

"If you are troubled with show-through, the Krebs folks will do a swell job for you. Their pigments eliminate show-through and make reading easier. Too, if you have any technical pigment problems, the Krebs Technical Service men will be glad to help out. Drop them a line today."

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Section of the
Technical Association of the Pulp and Paper Industry

Edited by Ronald G. Macdonald, Secretary

Fibrous Raw Materials Testing Committee Report, 1941*

By B. E. Lauer,[1] Chairman

The projects of the Fibrous Raw Materials Testing Committee of the TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY which were active during the year were as follows: The dirt content of chips, the evaluation of pulp cordwood, holocellulose in wood, the screen analysis of chips, and the use of hydroxylamines for cellulose determination. Dormant for the year were methods for testing rags, and for the identification of pulpwood trees. The identification of nonwoody fibers, a project long under committee consideration has been turned over to the Microscopy Committee for further work.

Status of Committee Projects

1. *The Dirt Content of Chips.* This method which has been under study by the committee is nearly ready for publication. The method was revised early in the year and sent to all the committee members for criticism. The replies were all assembled, the method entirely revised, and again mailed to the members. About half of them have now commented on this latest revision and judging from the tenor of replies it is apparent that the method with one more revision will be approved by all the committee members.

2. *The Physical Evaluation of Pulp Cordwood.* This method has for several years been a part of the TAPPI Standards as a proposed method. A revision of this method in a few details will overcome all the expressed objections to the method in its present form and will allow it to be published as a Standard Method.

3. *Holocellulose in Wood.* Method approved for publication as a TAPPI Standard.

4. *The Screen Analysis of Chips.* A canvas has been made to learn from what sources screens suitable for the chip screen analysis can be purchased. In a project directed by the committee chairman variables affecting the results of a chips screen analysis have been studied with a view of providing this information as a basis for the formulation of a method for this analysis. Results of these findings have been prepared in manuscript form and will probably be published in the near future.

5. *The Use of Hydroxylamines for Cellulose Determination.* This is still in the form of a research project financed by the TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY and directed by E. C. Jahn. Final results of this project were presented at this meeting.

Literature Survey

The number of technical papers relating to the procedures for the determination of chemical and physical characteristics of wood and other cellulosic raw materials as reviewed for 1941 is somewhat above the usual figure. This is important since through the research effort directed along these lines there is produced information which is useful in revising and improving existing methods for these determinations. Occupying its usual position of foremost importance is the investigation of the methods of isolation, the properties, and the procedures for the quantitative determination of lignin.

In connection with the estimation of lignin the work of Ploetz*(1)* and his coworkers*(2)* has been most thorough. They have indicated that each wood requires an optimum concentration of sulphuric acid for lignin determination, this optimum being that concentration which will produce the minimum yield. They report that lower concentrations leave residues of undissolved carbohydrates and higher concentrations produce humin and both conditions cause apparent increased yields of lignin. Further they have stated that when the lignin content fails to pass through a minimum, the methoxyl content of the lignin can be used as the determining feature, the methoxyl always passing through a maximum somewhere within the range of allowable acid concentration. For four woods studied the optimum concentration varied from 66.5 to 75% H_2SO_4.

The use of sulphuric acid in the microchemical determination of lignin has been reviewed by Stumpf and Wiesenberger*(3)* who used the microtechniques of Emich and of Benedetti-Pichler. Improvements in equipment were described and comparisons of results between micro and macro determinations were given. Appelqvist*(4)* made lignin determinations using 70% H_2SO_4. The reaction mixture was shaken for a period of four hours instead of the usual practice of allowing it to stand quietly for 20 to 24 hours. Sprucewood by this method was found to contain

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26.2% lignin, a close check to the results reported by Stumpf and Wiesenberger*(3)*. A new method for lignin determination has been outlined by Weichert*(5)* who recommends the use of hydrogen fluoride. His procedure can be completed in a much shorter time than the sulphuric acid methods and the reason he ascribed to the fact that slightly lower values were obtained for lignin by this method was that less humus substance was formed from the carbohydrates. It is claimed that accuracy is great enough for micro-scale determinations. It seems quite possible that findings reported by Kleinert*(6)* concerning the absorption of phenol by various constituents of wood may point the way toward new methods for lignin determination.

The cellulose content of wood and its quantitative determination has also come to the attention of several investigators. The use of ethanolamine as a reagent for the quantitative dissolution of the non-cellulosic portions of wood has been reported by Bloom and Jahn*(7)*. They report results reasonably close to the ordinary Cross and Bevan cellulose by 1 to 5 hours treatment with boiling ethanolamine followed by one or two of the ordinary Cl-H_2O-Na_2SO_3 treatments. Somewhat related to this work is the report by Reid, Dryden, and Aronovsky*(8)* on the effect of monoethanolamine upon the lignin isolated from corncobs. Variations of the method of determining cellulose with bleaching powder have been studied by Handa*(9)*. Hukuda*(10)* has made a review of the methods of cellulose determination which use chlorine gas. Aleksandrova and Myasnikova*(11)* in describing a method for determination of cellulose in plants and soils indicate that it is necessary to separate cellulose in plants from hemicellulose and lignin by treatment with dilute solutions of alkali and chlorine. The possibility of determining cellulose with iodine is suggested by the work of Frey-Wyssling*(12)*.

The effects on the analysis of wood for cellulose, lignin and pentosans by the pretreatment of the wood sample with various concentrations of caustic soda have been studied at length by both Hellstrom*(13,14)* and Mackney*(15)*.

The determination of the pulping properties of spring- and summerwood has been made by Johansson*(16)*.

Koon and Keeper*(17)* in a report on the effect of broomed ends on the dirt count of pulp have found that the dirt content of the pulp was raised by the inclusion of this material in the pulpwood chips used for cooking. Specks in paper from straw, or from weeds pulped with the straw, were shown by Armitage*(18)*.

In connection with pulpwood evaluation Martin*(19)* describes methods for sampling cordwood and for tests giving cubical content of cordwood samples, density, moisture, weight of wood per cord, and the "cull factors."

A number of technical articles have been written concerning the chemical composition of various woods. Richter*(20)* has reported on the cellulose content of birch, beech, and maple, the pulpwoods of Manchukuo have been studied by Hukuwatori and Hosino*(21)* and by Sikata and Kimura*(22)*. Canadian hemlock was analyzed by Ueda and Nebu*(23)*, and Zorastrova*(24)* studied the chemical composition of certain firs of the Far East. Pulpwood quality and its relationship to mechanical pulping was studied by Wegelius*(25)*.

The chemical composition of spruce and fir bark was reported by Sharkov*(26)* and that of pine bark by Sharkov and Kalnina*(27)*. The constituents of balsam bark were determined by Hay and Lewis*(28)* and of pine needles by Orlova and Nikitin*(29)*. The cellulose content of sunflowers was determined by Afferni and Milani*(30)*.

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Lignins Isolated in the Presence of Butanol*

By H. Y. Charbonnier [1]

Abstract

To check the recent claims of pulping wood by means of a butanol-water mixture and preparation of a new type of lignin called "butanol lignin," a number of cooks were carried out with buffered and unbuffered butanol-water solutions. It was not possible to obtain pulp yields as low as those claimed by the various authors, and the pulp obtained still had a high lignin content. In the case where alkali was added to the butanol-water mixture as a "catalyst," the same results as those reported in the literature were obtained with respect to yield and lignin removal.

A cook was carried out under the conditions specified for "alkali-catalyzed" cooks, with the exception that the butanol was replaced by dioxane, an inert solvent. As could be expected the result proved that alkali is the active pulping agent rather than serving "the sole function of catalyzing the lignin-butanol condensation." As the same pulping result is obtained when butanol is replaced by inert dioxane, the butanol takes no part in the actual reaction.

A true butanol lignin has been prepared by the extraction of the lignin from the wood with butanol in the presence of minute amounts of anhydrous hydrochloric acid as a catalyst, whereby a butanol lignin condensation product is formed. The presence of butoxyl groups in this butanol lignin has been established.

The purified lignins from a neutral cook, an alkaline butanol-water cook, and the hydrochloric acid-catalyzed straight butanol cook were compared by a number of quantitative tests. These compounds were found to be different with respect to their methoxyl contents, elementary composition, behavior toward methylation with diazomethane and toward treatment with 72% sulphuric acid, and in their ultraviolet absorption spectra. Although lignin from the neutral butanol-water cook resembles native lignin in its chemical behavior, that from the "alkali-catalyzed" cook proves to be an alkali lignin. A true butanol lignin—i.e., a condensation product of butanol with lignin—is formed only in the presence of a catalyst such as hydrochloric acid.

The earliest work on the treatment of wood with butanol is that reported by Hägglund and Urban *(1, 2)*. They carried out alcoholyses of wood with methyl, ethyl, isobutyl, and isoamyl alcohols, using concentrated hydrochloric acid as a catalyst. The procedures adopted were modeled after those of Holmberg and Runius *(3)*, who carried out the alcoholysis of wood with ethyl alcohol and hydrochloric acid. Hägglund and Urban did not isolate the isobutanol derivative from the condensation product, but they did make alkoxyl determinations, and calculated the amount of methoxyl and isobutoxyl present. Their alkoxyl determinations were carried out according to the method of Willstätter and Utzinger *(4)*.

Based on a patent by Kleinert and Tayenthal, Aronovsky and Gortner *(5)* in 1936 carried out experiments on the pulping properties of various alcohols and other organic solvents used in 1:1 dilution with water. They found that the most effective agent studied was *n*-butyl alcohol (butanol). When aspenwood was cooked with butanol-water mixtures, good pulping was obtained, but in the case of jack pine, the results were very poor. The lignin was isolated from the liquors of one of the jack pine cooks, but no extensive investigations were carried out on the product, as this work was primarily a pulping study. However, the authors assumed that no alkoxyl groups were added to the lignin, this assumption apparently being based on statements by Kleinert and Tayenthal *(6)*, rather than on actual analyses. A patent was taken out by Aronovsky *(7)*, based on the above work, to cover the use of butanol as a pulping agent.

McMillen and coworkers *(8)* continued the work of Aronovsky and Gortner to study further the differences observed in the butanol pulping of jack pine and aspen. The results of cooks on six species of hardwoods and six species of softwoods corroborated the findings of Aronovsky and Gortner — i.e., the hardwoods were easily delignified, whereas the softwoods were very poorly pulped, if at all.

In the early part of 1940 Bailey *(9, 10)*, who had cooperated with McMillen in the work mentioned above, reported additional work on the butanol-water cooking of jack pine and aspen. The author stated that an examination of the lignins isolated from neutral and alkaline cooks of jack pine revealed that they were "similar or identical."

Alkaline "accelerated" cooks were also made on aspen; in these the time for delignification was greatly reduced.

As a result of this work on alkaline butanol pulping, Bailey obtained a patent *(11)* somewhat similar in scope to that of Aronovsky, but providing for the use of sodium hydroxide. The amounts specified were from 2 to 10% on the basis of the liquor, corresponding to 40 to 200% on the basis of the wood, if the recommended 20 to 1 liquor ratio were used. In a later publication on "butanol lignin" *(12)*, its physical properties were discussed and the claim that a new type of lignin had been isolated was again emphasized.

Cooking Experiments

Inasmuch as this investigation was primarily concerned with a study of lignins isolated in the presence of butanol, whereas the investigation of the pulping effect of butanol was of secondary importance, all of the wood meal was extracted thoroughly before cooking. This was necessary in order to prevent any possible contamination of the lignins with materials from the extractives of the original wood. Any extractive materials, especially after possible polymerization or resinification under the cooking conditions

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applied, would very probably be carried through the purification processes used for the isolation of the lignin and appear as purified lignin.

The cooks were carried out on jack pine *(Pinus banksiana* Lambert) heartwood selected from a 35-year-old tree, which had been seasoned for six months in an unbarked condition. The log was reduced to a meal passing a 10-mesh and held on a 60-mesh screen. The meal was successively extracted for 48 hours with ethanol, for 24 hours with an alcohol-benzene (1:2) mixture, and finally for 4 hours with hot water (85 deg. C.). A quantitative determination of the extractives in the wood indicated the presence of 3.82% alcohol-soluble, 0.30% alcohol-benzene-soluble, and 2.23% hot-water-soluble material. After it was reduced to 40-60 mesh, the extracted wood meal was analyzed, with the following results:

MeO in wood	5.53%
Pentosans in wood	11.70%
Lignin in wood	30.60%
MeO in lignin	15.82%

The cooks were carried out in a stainless steel autoclave of 5750-cc. capacity, provided with a thermometer well and a calibrated thermometer, a calibrated pressure gage, a relief, and a safety valve. In addition, a sampling device was constructed for the purpose of withdrawing portions of the liquor at any time during the cook. This device consisted of a system of stainless steel tubing provided with suitable valves, gages, condenser, and fittings for a nitrogen back-pressure line.

The heating was carried out in an indirect manner with a wax bath. The autoclave was immersed in the wax (previously heated to approximately 150 deg. C.) to a level corresponding to that of the liquor inside, thus eliminating the possibility of local overheating. The temperature was raised to the desired level as fast as possible and maintained within one degree by the use of a small gas burner. When the digester had attained a temperature of 100 deg. C., the air was relieved. At the end of the cook, the digester was removed from the bath and allowed to cool to approximately 100 deg. C. It was then placed in a running-water bath and cooled to room temperature.

The contents were filtered on a large Büchner funnel, the "pulp" washed with two 800-cc. portions of distilled water, the filtrate added to the main solution, and the whole set aside for isolation of the lignin. The pulp was then washed with 800 cc. of alcohol, and finally with successive portions of distilled water till the filtrate was free of color. The pulp was air dried, weighed, a sample taken for moisture determination, and the remainder stored in an airtight bottle. The cooking conditions, the yields of pulps, and the lignin contents of the pulps are given in Table I.

TABLE I.—COMPOSITE COOKING RESULTS ON JACK PINE

Cook	1	2	3	4	5
Temperature, deg. C.	158	158	167	166	166
Pressure, p.s.i.	111	111	135	133	132
Time at Cooking Temperature, hr.	4	4	4	1	1
Weight of Wood Meal:					
Air dry, g.	132.4	134.2	..	215	54.6
Moisture-free basis, g.	125.0	125.0	126	200	50.0
Cooking Liquor:					
Butanol, cc.	2000	2000	2000	2000	500[1]
Water, cc.	2000	2000	2000	2000[2]	500[3]
Liquor to Wood Ratio	32:1	32:1	31.7:1	20:1	20:1
Yield of "Pulp," g.	87.1	78.4	70.5	44.3	46.8
Lignin in "Pulp," %	30.4	28.3	25.4	5.2	7.4

[1] Dioxane only.
[2] Eighty g. NaOH added.
[3] Twenty g. NaOH added.

Cook 1 was a buffered butanol-water cook and was carried out according to Bailey's Cook 10 *(9)*, using 55.2 grams of monosodium phosphate and 143.5 grams of disodium phosphate for buffering. To follow the change of the pH during the cook, 50-cc. samples of the liquor were withdrawn at one-hour intervals, cooled to room temperature, and the pH determined by means of a glass electrode. In the course of the cook, the pH fell from 6.57 to 6.06. According to Bailey, the purpose of making a buffered cook was to prevent hydrolysis of any glucosidic linkage which might be present between the lignin and carbohydrate material in wood. However, he found that the results of the buffered experiments checked with those obtained with an unbuffered cook, and therefore he discontinued such cooks.

A neutral butanol-water cook (Cook 2) was made to duplicate Bailey's Cook 8A *(9)*. In this case, the pH fell from 6.32 to 4.13. Cook 3 was carried out under the same conditions as Cook 2 except that the temperature was increased to 167 deg. C. and a moisture-free wood flour of 60- to 160-mesh was used.

Cook 4 corresponded to Bailey's "alkaline accelerated" cook and Cook 5 was the same as Cook 4, except that the butanol was replaced by dioxane.

Discussion of Cooking Results

In contrast to Bailey's findings, the results of Cooks 1 and 2 indicate that the actions of the buffered and unbuffered liquors were not identical. Almost twice as much material was removed in the unbuffered as in the buffered cook, and the pH of the final liquor was 4.1, compared with 6.1 for the buffered cook. This is in agreement with the work of Aronovsky and Gortner *(5)*, who found that a slight acidity was favorable for producing better pulping. Furthermore, as will be pointed out later, the methoxyl contents of the isolated lignins were not the same. In addition to the fact that the results of the buffered and unbuffered cooks were not in agreement, the pulp yields (87.1 and 78.4%) from both were considerably higher than those reported by Bailey (47.5 and 47.8%, respectively). This discrepancy may be due to a difference in the temperatures used. According to Bailey, the pressure in his cook at 158 deg. C. was 132 p.s.i. In Cooks 1 and 2, which were carried out at 158 deg. C., the pressure was only 111 p.s.i. An investigation of the temperature-pressure relationship of a 1:1 butanol-water mixture with standardized equipment revealed that the pressure of such a mixture at 158 deg. C. was 106 p.s.i. and at 166 deg. C. was 133 p.s.i. Cook 3 was therefore carried out at 167 deg. C. in order to obtain the higher pressure, but even then the yield of 70.5% is still considerably higher than the 47.8% reported by Bailey.

The result of the alkali accelerated cook, in which a normal yield of pulp (44.3%) with a lignin content of 5.2% was obtained, is in good agreement with the result reported by Bailey for such a cook. In spite of the fact that the amount of alkali corresponds to 40% on the basis of the wood, this author maintained that the function of the sodium hydroxide in the alkaline butanol cooks was solely for the purpose of "catalyzing the lignin-butanol condensation." However, this statement disagrees with the present day conception of alcohol-lignin condensation and it seems probable that this large amount of alkali was alone responsible for the pulping action. Therefore,

it was considered advisable to make an alkaline cook wherein the use of butanol was completely eliminated. To do this and still maintain conditions comparable with those described in Cook 4 presented a problem, as there were three possibilities: *(a)* merely to eliminate the butanol and leave other conditions the same; *(b)* to replace the butanol with an equal volume of water; or *(c)* to replace the butanol with an inert, unreactive solvent, at least partly miscible with water. After careful consideration, the first two possibilities were eliminated because, in either case, the effective sodium hydroxide concentration would not have been comparable with that in Cook 4. In connection with the third possibility, dioxane seemed to be the most suitable solvent. Dioxane is a stable ether, and as such could not possibly condense with the lignin. Of course, it was recognized that dioxane might to a certain extent, act as a solvent, but data of Aronovsky and Gortner *(5)* showed that the pulping effect of dioxane alone was exactly the same as that of water alone, in so far as yield was concerned. Furthermore, in spite of the patent by Engel and Wedekind *(13)* covering a pulping process with dioxane and acid, Brauns *(14)* has shown that purified dioxane, even in the presence of hydrochloric acid, has no pulping effect. The pulping action obtained by Engel and Wedekind was doubtless the result of the presence of glycol and other alcohols which exist as impurities in commercial grades of dioxane *(15)*. Accordingly, Cook 5 was made using conditions identical with those in Cook 4, but replacing the butanol with an equal volume of purified dioxane. The degree of pulping and lignin removal was almost the same as that obtained in the case of Cook 4 (the alkaline-butanol cook). This experiment demonstrates conclusively that the presence of butanol was not essential for pulping in the presence of alkali and, further, that the sodium hydroxide must have been the active pulping agent.

Isolation of the Crude Lignin from the Butanol Cooks

In the neutral and buffered cooks the lignin is present in the butanol layer. For its isolation, the butanol layer was separated from the aqueous layer. The butanol solution was filtered and evaporated to dryness under reduced pressure at a temperature not exceeding 40 deg. C. The red-brown tarry residue was placed in a vacuum desiccator over flake caustic and concentrated sulphuric acid to remove the last traces of butanol. After several days, the residue was taken up in a mixture of methanol and dioxane (1:1) to give a 10 to 15% solution. The solution was centrifuged, filtered, and added dropwise to 4 to 8 liters of distilled water which was violently agitated with a mechanical stirrer. The lignin precipitated in a colloidal condition, but was coagulated by the addition of a small amount of sodium sulphate. After stirring for several hours, the lignin was filtered on a Büchner funnel and washed well with cold water. The funnel and contents were placed in a vacuum desiccator over flake caustic and allowed to remain until the lignin had become thoroughly dry. This is designated as "crude" lignin.

The lignin from the alkaline cooks is present in the aqueous layer. This was filtered and acidified with dilute (1:1) hydrochloric acid until the solution was just acid to Congo red paper. The lignin precipitated in a very finely divided condition and was coagulated by the addition of small amounts of sodium sulphate. After settling, the lignin was filtered, thoroughly washed with water, and dried in a desiccator over sodium hydroxide. Inasmuch as all the alcohol condensation products hitherto known have been prepared in the presence of small amounts of mineral acids, or iodine, it seemed unlikely that alkali should catalyze the butanol-lignin condensation.

In order to compare the lignins isolated from these butanol-water cooks and a true butanol lignin, a true normal butanol lignin was prepared by methods similar to those used by Hägglund *(1)* for the preparation of the isobutyl alcohol-lignin condensation product. Modifications were introduced, based on the method of Brauns and Hibbert *(15)* for the preparation of methanol lignin.

Air-dry wood meal (107.5 grams), corresponding to 100 grams of moisture-free material, was covered with 1200 cc. of anhydrous butanol. Four hundred cc. of the butanol were distilled off under reduced pressure to remove the moisture in the wood meal. Then 90 cc. of dry butanol containing 5.1% hydrogen chloride by weight were added in order to make the total 0.5% in hydrochloric acid. The butanol-hydrochloric acid solution was prepared by passing hydrogen chloride gas (dried over phosphorus pentoxide) into a flask containing anhydrous butanol. After the acid-alcohol solution was thoroughly mixed with the wood meal, the mixture was refluxed for two hours, and then allowed to stand overnight. The next day, 90 cc. of the 5.1% acid-alcohol solution were added, the mixture thoroughly stirred, and again refluxed for two hours. When the material had cooled to room temperature, 200 cc. of butanol were distilled off under reduced pressure to remove the hydrochloric acid, the butanol solution was separated by filtration on a Büchner funnel, and the residue was washed twice with 500-cc. portions of purified dioxane. The wash liquors were added to the original filtrate. Several portions of ethyl alcohol were then used for washing the residue until no color appeared in the filtrate, after which the extracted wood meal was spread out to dry for several days. When the residue (pulp) had become air dried, it was weighed, and samples were taken for moisture and lignin determinations. The results follow: yield of residue 51.9% and lignin in residue 12.9%.

Purification of Crude Lignins

The final purification of the various lignin preparations was based on the precipitation from its dioxane solution into anhydrous ethyl ether. The crude lignin was made up to a 10% solution in purified dioxane, which was centrifuged, filtered, and added in fine drops to anhydrous ether in a centrifuge jar. A violent swirling motion of the ether was maintained throughout the precipitation. In order to make the precipitation as quantitative as possible, only 4 cc. of the dioxane solution were added to 80 cc. of ether. After each precipitation the lignin was centrifuged, the supernatant liquid replaced with fresh ether, and 4 cc. of dioxane solution again added. Following the third 4-cc. increment, the lignin was washed with fresh ether before continuing the addition of the dioxane solution. When all of the lignin had been precipitated, it was washed twice with ether and twice with petroleum ether, and then allowed to stand overnight in suspension in the petroleum ether. On the following day, the lignin was centrifuged, the

petroleum ether poured off, and the product dried in a vacuum desiccator over concentrated sulphuric acid. This purification process was repeated until the products showed a constant methoxyl content. All analytical results are given in Table II.

TABLE II.—ANALYSIS OF THE LIGNINS AND THEIR DERIVATIVES

Cook	1	2	3	4	5	6
Methoxyl in Lignin, %	14.1	16.2	16.0	14.8	15.2	19.7[1]
Carbon Content of Lignin, %	64.6	...	64.3	63.6	...	66.4
Hydrogen Content of Lignin, %	5.8	...	6.2	5.7	...	6.4
Methoxyl Content of Lignin, Methylated with Diazomethane, %	...	...	22.4	24.4	...	22.5[1]
Residue from 72% H_2SO_4 Treatment, %	...	...	90.2	83.6	...	87.1
Methoxyl Content of Residue, %	...	...	15.7	15.5	...	16.3

[1] Total alkoxyl (MeO + BuO) expressed as methoxyl.

The lignins of Cooks 1, 3, 4, and 6 were analyzed for their carbon and hydrogen content. The lignin preparations from the neutral butanol-water cook (3), from the alkaline butanol-water cook (4), and from the true butanol lignin condensation experiment (Cook 6) were further investigated by methylation with diazomethane in an anhydrous dioxane solution until a constant methoxyl content was obtained. The hydrolysis with 72% sulphuric acid was carried out by the Forest Products Laboratory method for the determination of lignin.

That the true butanol lignin contains butanol condensed with the lignin is shown by the following experiment. A sample of 750 mg. purified true butanol lignin was treated with 5 cc. 72% sulphuric acid in a small ground-stoppered weighing bottle at 20 deg. C. for two hours. An unmistakable odor of butyl alcohol was noticed after addition of the acid. After this period the mixture was washed into a flask using enough water to make the solution 3% with regard to sulphuric acid. The mixture was then boiled for 4 hours using a reflux condenser, cooled, and filtered. The filtrate was transferred to a continuous extractor for liquids, saturated with sodium sulphate, and extracted with ether for 30 hours. The ether was dried with sodium sulphate and filtered. To the filtrate, 0.2 gram of 2,4-dinitrobenzoyl chloride was added, after which the ether was evaporated. The residue was heated at 60 deg. C. for 10 minutes and then taken up in ether. To remove the dinitrobenzoic acid, the ether solution was washed with aqueous sodium bicarbonate solution and water. The ether solution was then dried with sodium sulphate, filtered, and evaporated. Long needle-like crystals appeared in the residue, which were twice recrystallized from 95% ethyl alcohol and dried in a vacuum desiccator over flake caustic and sulphuric acid.

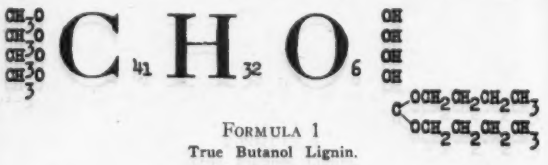
An authentic sample was prepared from butanol and 2,4-dinitrobenzoyl chloride and recrystallized from 95% alcohol to a constant melting point (62.8 deg. C.). The product obtained from the butanol lignin melted at 61 deg. C. This melting point was not depressed when the product was mixed with the synthetic ester.

Discussion of Results

In interpreting the results of these studies, all calculations concerning constituent groups in the lignin will be based on the lignin building unit (with a molecular weight of 840), which was proposed by Brauns *(17)* for native spruce lignin. This building unit has been found to possess four methoxyl groups, four hydroxyl groups, and an enolizable carbonyl group.

It has been shown that condensation of the lignin with monohydroxy alcohols takes place at the carbonyl group with the addition of two alkoxyl groups in the form of an acetal linkage. The empirical formula for true butanol lignin would then be represented by Formula 1. This formula is analogous to that of methanol lignin *(17)*. The methoxyl values found for the true butanol lignin (19.7%) represents the total alkoxyl, expressed as methoxyl. On the basis of Formula 1, the theoretical methoxyl content of true butanol lignin is 12.7%, whereas the theoretical total alkoxyl content, expressed as methoxyl, is 19.2%. The butyl iodide produced by decomposition with hydriodic acid is carried over into the receivers in the regular methoxyl determination. This same condition was reported by Hägglund *(1)*, who used the method of Willstätter and Utzinger *(4)* to separate the alkoxyls. A method based on similar principles was used on the true butanol lignin, with the following results: methoxyl content 11.6%, and butoxyl content 11.0%.

The theoretical values are 12.7% for methoxyl and 15.0% for butoxyl; therefore, it is evident that only 84% recovery was achieved. Because of time limitations, the complete separation and recovery of the methoxyl and butoxyl groups was not carried out; however, the experiment was successful in that it showed the presence of both groups in approximately the correct theoretical proportions. The alkoxyl content of 19.7% (calculated as methoxyl) compared with the theoretical value of 19.2%, constitutes strong evidence that a true butanol lignin had been prepared.



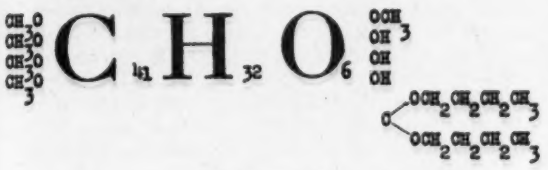
FORMULA 1
True Butanol Lignin.

The "free butanol lignin" (from Cook 3) had a methoxyl content of 16.0%. No comparison can be made with the methoxyl content of jack pine native lignin because it has not been isolated. However, this may be compared with the 15.8% methoxyl content of the Klason lignin from jack pine wood meal. It indicated that there was practically no alkoxyl present in addition to the original methoxyl in the native lignin.

The value of 14.8% for the methoxyl content of the "total butanol lignin" from the "alkaline catalyzed" Cook 4 is in the range of values usually obtained for softwood alkali lignins. In a study of a purified alkali lignin from spruce, Marshall, Brauns, and Hibbert *(18)* obtained a methoxyl content of 14.9%. The methoxyl contents of these compounds show quite conclusively that the three lignin preparations were all different.

Samples of these different types of lignin were methylated with diazomethane in anhydrous dioxane solution as described above until a constant methoxyl content was obtained. Under these conditions, phenolic, enolic, or carboxylic hydroxyls become methylated. It has been shown *(17)* that there is one phenolic hydroxyl present in the lignin building unit, in addition to an enolizable carbonyl. These two hydroxyl groups are methylated by diazomethane. However, when the enolic hydroxyl is covered with alkoxyl groups, as in the case of butanol lignin,

methylation with diazomethane can introduce only *one* additional methoxyl group into the building unit, as shown in Formula 2.



FORMULA 2
Diazomethane-Methylated Butanol Lignin.

On methylation of the true butanol lignin with diazomethane, the total alkoxyl content, expressed as methoxyl, was raised from 19.7 to 22.5%. This increase corresponded very closely to the addition of one methoxyl group, thus providing evidence that only one phenolic hydroxyl group was methylated. The compound is therefore a true butanol lignin (*see* Formula 2).

When "free butanol lignin" (Cook 3) was methylated with diazomethane, the methoxyl content increased from 16.0 to 22.4%. This increase amounts to a little more than *two* methoxyl groups per unit, so that the "free butanol lignin" cannot be a true butanol lignin.

When "total butanol lignin" (Cook 4) was methylated, an even greater increase in methoxyl content was obtained. The increase from 14.8 to 24.4% corresponds to an entrance of three new methoxyl groups per building unit and approaches the methoxyl content (24.8%) found by Marshall *(18)* for alkali lignin B. This indicates that in an alkaline butanol cook another phenolic hydroxyl is uncovered or made available and that "total butanol lignin" is identical with alkali lignin.

Further clear evidence as to the differences in the three lignin preparations is found in the elementary analyses (Table II). A calculation based on the theoretical formula for butanol lignin (*see* Formula 1) indicates a carbon content of 66.6% and a hydrogen content of 6.78%. The actual values found for the true butanol lignin prepared —66.44% for carbon and 6.37% for hydrogen — agree closely with the theoretical figures. The high percentage of carbon and hydrogen for this compound, compared with those for the lignins isolated in uncombined form, is due to the addition of two butyl groups, which reduces the proportion of oxygen in the condensation product. The values obtained for the "free butanol lignin" and for the "total butanol lignin" are in the range of values reported for many isolated lignins, such as 63.9% carbon and 6.19% hydrogen as reported for native spruce lignin *(17)*.

The value of 63.6% for the carbon content of the lignin isolated from the alkaline butanol cook is considerably higher than those found by Bailey for "total butanol lignin," who reported 60.8 and 62.3%. This can be explained only on the ground that hemicelluloses, which are precipitated from the alkaline solution, have not been removed by Bailey's purification method. The presence of hemicellulose tends to lower the carbon content. This is supported by the low methoxyl content found by Bailey for total butanol lignin from western hemlock.

When methanol lignin is subjected to a treatment with 72% sulphuric acid, the two acetal-linked methoxyl groups are split off, whereas the remaining four methoxyl groups existing in true ether linkage are unaffected. Samples of the three lignins were subjected to such a treatment, the conditions adopted being identical with those used in the lignin determinations. The residues were tested for methoxyl contents (Table II).

In the case of the true butanol lignin, an unmistakable odor of butyl alcohol could be noticed when the 72% acid was added. No odor could be detected from the other two lignins. The facts that butanol has been isolated from the filtrate of the hydrolysis and that there was a drop in the total alkoxyl (as methoxyl) from 19.7 to 16.3%, leave no doubt that butyl groups were split off from the true butanol lignin.

The action of 72% sulphuric acid on the "total butanol lignin" gave a residue in which the methoxyl content had *increased* from 14.8 to 15.5%. If butoxyl groups had been present, there should have been a decrease in the methoxyl content after treatment. The loss of 16.4% of the "total butanol lignin" on the sulphuric acid treatment is not surprising as lignin is degraded in the alkaline cook and rendered partly soluble by the 72% sulphuric acid.

These facts indicate that the increase in methoxyl content of the "total butanol lignin" may be due to the removal of some material containing a low methoxyl content which was soluble in dioxane, but insoluble in dilute acids and ether, thus resisting the purification treatment.

The methoxyl content of the "free butanol lignin" was practically unchanged on treatment with 72% sulphuric acid. The slight decrease may be considered to be within the experimental error in the methoxyl determination on an amorphous, high molecular compound such as lignin, and therefore it is difficult to say that it could be attributed to the loss of butoxyl groups. Even if this decrease were caused by the loss of butoxyl groups, the magnitude of the decrease would correspond to only one butoxyl group in every 10 or 15 lignin-building units, rather than two butoxyl groups in each unit. Therefore, this "free butanol lignin" cannot be considered a true butanol lignin or lignin-butanol condensation product.

The decrease of 9.8% in yield may be due to the removal of some material combined with the native lignin and may correspond to that part which is split off from native spruce lignin when treated with 42% hydrochloric acid or 72% sulphuric acid *(17)*.

The ultraviolet absorption spectra were determined on the quartz spectrograph, using the multistep sector photometer, following the procedure of Glading *(19)* with the exception that the solvent used was 100% purified dioxane, and the cell used had a thickness of one cm. The curves are shown in Fig. 1.

Curves for the absorption in the visible range were obtained on the General Electric recording spectrophotometer. As could be predicted from Glading's work, nothing particularly significant was obtained from the data in the visible range. However, the observation was made that the absorption coefficient of the lignin from the alkaline butanol cook was consistently higher over all wavelengths than in the case of the other two compounds. This is in agreement with Glading's statement that "The reaction of lignin with . . . alkaline pulping agents increases its absorption coefficients in the visible and near visible regions."

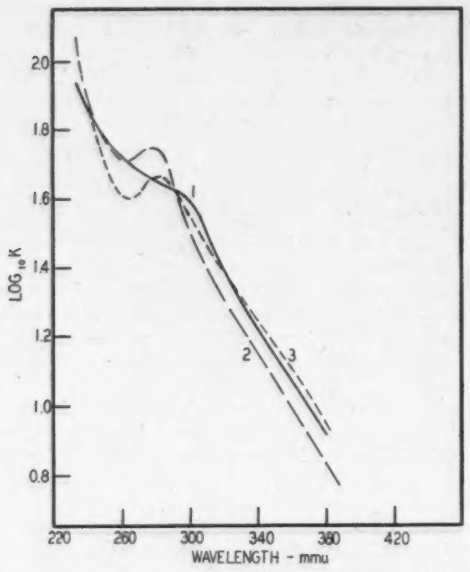


FIG. 1

Ultraviolet Absorption Spectra of Various Lignins Isolated in the Presence of Butanol. 1. Lignin from Alkaline Cook; 2. Lignin from Neutral Cook; 3. True Butanol Lignin.

A consideration of the curves in Fig. 1 and of the calculated absorption coefficients at 280 mμ wavelength provides one with further clear evidence of differences in the three lignins under discussion. Glading found that practically all lignin derivatives showed a maximum in the absorption curve at 280 mμ. However, in the case of alkali lignin, his curve shows no point indicating a clearly defined maximum, a phenomenon supported by the data of Herzog and Hillmer *(20)*. This identical condition is found in the case of the curve for the "total butanol lignin," showing that this compound is similar to a true alkali lignin, at least in so far as structural elements responsible for ultraviolet absorption characteristics are concerned. The curves for the "free butanol lignin" and the true butanol lignin show the usual maximum at 280 mμ which is found in the case of all lignins and lignin derivatives other than alkali lignin. However, they differ markedly in the calculated absorption coefficients at this wavelength, giving additional support to the proposition that these two lignins are different.

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Pulp Purification Committee Report, 1941*

By Donald T. Jackson[1]

The Pulp Purification Committee of the TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, which was organized to promote the study of the various phases of pulp purification with special attention to the chlorination, alkaline extraction, and oxidative stages of pulp bleaching, has continued its work in these fields during 1941. The committee has for several years past sponsored the preparation of a critical review of the current publications dealing with pulp bleaching *(1, 2, 3)*. A similar review for the year 1941 is now in the course of preparation *(4)*.

A major project was completed by the publication of the translation of Loeschbrandt's report entitled, "The Bleaching of Sulphate Pulp" *(5)*. The committee wishes to express its deep appreciation to E. Martin of the Solvay Process Company for the excellent translation, and to John Schuber, Bjarne Johnsen, T. W. Toovey, and the many others who assisted in preparing the translation for publication.

A symposium on "The Chlorination of Chemical Wood Pulps" was given at the 1941 Annual Meeting. The information collected at this time has proved very helpful in establishing a basis for theoretical and practical considerations of one phase of pulp bleaching. Similar consideration of the other major phases of pulp bleaching is planned for the future.

A round table discussion featuring a number of papers on "Methods of Determining Oxidizable Materials in Pulp (Bleachability), Liquors and Wash Waters", organized by John D. Rue in cooperation with the Subcommittee on Oxidizable Materials, Committee of Standards and Methods, Cellulose Division of the American Chemical Society, was held at the 1941 Fall Meeting in Ann Arbor, Michigan. A questionnaire on this subject was sent to all TAPPI members. The replies have been summarized in a report by Rue *(6)*.

The question of publishing a monograph on pulp bleaching and purification is still under consideration by the committee. No definite action is anticipated until conditions in the industry become more nearly normal.

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* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 16-19, 1942.

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Two-Sidedness of Colored Paper*

By Otto Kress [1] and Edwin J. Loutzenheiser, Jr. [2]

Abstract

The problem of two-sidedness has been approached from the standpoint of the behavior of the various fractions of the pulp being dyed. A convenient method is described for the preparation of large quantities of the fines (through 150-mesh). A chemical analysis of the long (on 20-mesh) fibers and of the fines offers an explanation of the greater affinity of the fines for various dyestuffs. The fines also have a much greater tendency to settle out of suspension. It is shown that the fines are concentrated on the felt side of a sheet made on a paper machine but on the wire side of a sheet made on a sheet mold.

This is a result of the difference in conditions under which the sheets are made, fines being lost from the wire side on the paper machine because the sheet is formed so rapidly that there is no appreciable time for the fines to settle to the wire side of the sheet. Colored fines added to an undyed pulp and made into a sheet are so completely dispersed that they behave like pigment dyestuffs. Sheets made from pulp of uniform fiber length show very little tendency of being two-sided. The relation of six classes of dyestuffs to two-sidedness is discussed.

Causes of Two-Sidedness

Cornely *(1)* has classified two-sidedness into two groups. The first he calls "structural two-sidedness", because it is caused by the separation of different fiber furnishes. The second is designated "colored two-sidedness"; it is closely related to structural two-sidedness, and usually intensifies it. Since the color sensation of the human eye depends upon the light reflected from the paper sheet, the characteristics of the sheet surfaces themselves have much to do with two-sidedness. Fibers of the same color may form sheets of different surface characteristics and appear differently colored.

Certain dyes seem to have much more of a tendency to produce two-sidedness than do others. Some have a special affinity for certain types of stock, fillers, sizing agents, and the like. Certain dyes bleed from the dyed fibers more easily than others, and some burn to the surface of the dyed sheet on drying. The final product in each of these cases is a two-sided sheet. Direct, or substantive, dyestuffs are among those which show the least tendency for two-sidedness *(2)*. Roberts has discussed many reasons for this behavior *(3, 4)*.

Beater conditions have been blamed for much of the two-sidedness in paper. The stock furnish is important, particularly if several different kinds of stock are used—as for example, mixed furnish of groundwood and sulphite pulps. Certain classes of dyestuffs have a particular affinity for one or more of these stocks, thus dyeing some heavier than others. The order of addition of the furnish to the beater, circulation, temperature, and pH in the beater are important. The latter should be kept if possible within the prescribed range specified by the dyestuff manufacturer for the particular dyestuff. The hydration and freeness of the stock is important. Jordaning tends to increase the number of short fibers which are pulled through the wire and lost in the white water.

Short-fibered stock, fillers, and such materials are carried through the wire by the flow of water from the sheet. This separation of the furnish on the wire causes structural two-sidedness by making the wire side deficient in filler, short fibers, and in color. The washing action of the table rolls tends to increase this deficiency on the wire side.

Suction boxes can produce two-sidedness in three ways *(5)*: *(A)* Materials, such as fillers and short fibers contained in the web, may be pulled out completely. *(B)* These materials may be drawn to the wire side. *(C)* They may be left intact on the felt side and carried away from the wire side. Therefore, the practice of graduating the vacuum on the suction boxes or of adding an extra box or two has been beneficial. Suction rolls give a great deal of trouble for the same reason. Some mills add color to the wire side of the sheet by suitable rolls to equalize depth of color of felt and wire side of the sheet.

Pressing of the sheet many times results in two-sidedness, particularly if the sheet is not reversed and the same side is always in contact with the felt on the machine. One of the worst causes of the duplex-colored sheet is found in the drying operation. This may result from contact of the cold wet sheet against the hot surface of the first drier *(2)* and is especially true with colors which do not have a marked affinity for the fibers. Calendering and supercalendering only intensify the two-sidedness of a sheet, particularly structural two-sidedness *(6)*.

In the above discussion the various causes of two-sidedness have been reviewed briefly, the affinity of various dyestuffs for various types of stocks has been considered, but nothing has been said about the varying affinity of various fractions of a pulp for any given dye. Several investigators have noticed that in certain cases the finer portions of a pulp were more deeply colored than the longer fractions of the same pulp. An investigation revealed that in a sheet of bond paper, 18.2% of the fines were on the felt side and 11.1% on the wire side of the sheet. These two facts would seem to offer a reasonable explanation for the phenomenon of two-sidedness of colored paper, especially since they are consistent with the fact that the paper is more deeply colored on the felt side. For this reason it seems logical to study the affinity of various dyestuffs for the fiber and fine fractions of pulps.

Experimental Work

Samples of western hemlock bleached and un-

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A portion of a thesis submitted by the junior author in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Master of Science from Lawrence College, Appleton, Wisconsin, June, 1941.

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bleached pulps were fractionated using the Bauer-McNett classifier. In this manner four fractions of the pulps were obtained. A special method was devised to obtain the fines (that fraction which passes 150), because filtering the water passing from the classifier proved too slow. A large batch of pulp (about 400 grams) was disintegrated, and run down an inclined screen covered with an 80-mesh wire. The water running through the screen, which carried the shorter fraction, was caught and placed in large containers, allowed to stand overnight, and the supernatant water siphoned off. The concentrated fines were then classified. All the water passing from the classifier was caught, the fines allowed to settle, and the excess water siphoned off. These concentrated suspensions of fines were then used in the dyeing operations.

Affinity to Dyestuffs

From the work done in this investigation, and by others, it was evident that all dyestuffs seemed to show a greater affinity for the fines than for any other fraction of the pulp. Therefore, the chemical and physical properties of each fraction of pulp were investigated in an effort to explain this variation in dye adsorption.

TABLE I.—FRACTIONATION DATA BY BAUER-McNETT EQUIPMENT

	Western Hemlock Sulphite	
	Bleached %	Unbleached %
On 20 mesh	71.7	69.9
Through 20 and on 35	10.2	12.8
Through 35 and on 65	6.2	6.3
Through 65 and on 150	4.9	4.1
Through 150	7.0	6.9

Microscopic slides were prepared and fiber length measurements made. The fiber lengths for the bleached and unbleached pulp were about the same; thus it is not necessary to distinguish between the two when giving approximate lengths.

TABLE II.—FIBER LENGTHS IN MICRONS

	Short	Long	Average
Through 150-mesh	40	220	140
On 150-mesh	320	840	590
On 65-mesh	900	1300	1100
On 35-mesh	1600	2500	2240
On 20-mesh	2600	3500	3300

Because time did not permit the use of all five fractions of the pulp, several preliminary staining tests were made to decide from the color of the stained pulp which fractions should be studied. Bright stain, cooking stain, "A" stain, "C" stain, and Herzberg stain were used in these preliminary studies. From the results it was seen that the fraction on 20-mesh gave the same colors as the fraction through 20- and on 35-mesh. Hence, it was decided to discard the latter and use only the fraction separated by the 20-mesh as representative of the longer fractions of the pulp. This was also true of the through 35- on 65-mesh and the through 65- and on 150-mesh fractions, and therefore these two fractions were mixed and used as representative of the short fractions of the pulp.

Fractions

The four portions to be used in the dyeing experiments can thus be summarized as follows:

1. Original—the original unfractionated pulp.
2. Long—on 20-mesh screen.
3. Short—though 35- and on 150-mesh screen.
4. Fines—through 150-mesh screen.

The chemical differences between the various fractions of pulp seemed to be one of the logical reasons for the varying affinity of dyestuffs for these fractions. Much information is available for pulps of mixed fiber lengths, but no complete chemical analysis could be found for fractionated pulp, except for a few values reported by Kress and Brainerd *(7)* and Schafer and Santaholma *(8)*. Only the long fraction and fines of both the bleached and unbleached pulp were analyzed, because they represent the two extremes in fiber length, using in general, TAPPI standards.

TABLE III.—CHEMICAL ANALYSIS OF THE PULPS[1]

	Bleached Pulp		Unbleached Pulp	
	Long	Fines	Long	Fines
Ether soluble, %	0.13	2.82	0.15	2.58
Ether insoluble, %	0.12	0.47	0.15	0.92
Alcohol soluble, %	0.25	3.29	0.30	3.50
Cross-Bevan cellulose, %	97.9	98.7	95.1	92.1
Alpha-cellulose, %	83.1	85.0	86.9	85.2
(Corrected for lignin)	...	...	85.7	74.5
Beta- and gamma-cellulose, %	12.75	14.83	13.34	14.45
Beta-cellulose, %	1.12	4.88	2.38	4.64
Gamma-cellulose, %	11.63	9.95	10.96	9.81
1% NaOH solubility, %	14.48	17.22	19.07	22.02
Ash, %	0.19	0.35	0.26	0.41
Lignin, %	1.00	5.05	1.84	10.04
Copper number	2.22	2.94	2.86	4.90
Viscosity, centipoises	27.0	12.66	137.1	24.76

[1] All values are on the moisture-free, unextracted basis except lignin and Cross and Bevan cellulose, which are on moisture-free, extracted basis.

The results of the chemical analysis (Table III) show very definite differences in the chemical composition of the fines and the long fractions. These differences probably will have a decided effect on the depth and shade of the dyeings produced by certain dyestuffs in the use of which two-sidedness of the finished dyed paper is apt to occur.

Dyeings

Six different dyestuffs representing true dyestuffs and pigments were used in this investigation. These included one from each class of dyestuffs and were chosen because they could be considered representative of their class. The dyestuffs used were:

1. Orange II concentrated.
2. Brilliant green crystals.
3. Soluble Prussian blue.
4. Sky blue 6BX.
5. Dispersed vat color pigment.
6. Phosphotungstate blue.

The dyeing procedure was carried out in a manner similar to that used by most mills in making laboratory matches. All stock was sized with rosin size, and all dyeing took place at a pH of 4.5 to 5.0, the pH being adjusted by the addition of alum.

First, it was desired to investigate the affinity of each of the dyestuffs for each fraction of the pulps. At the same time it was desired to know whether sheets made from stock all the same fiber length showed any two-sidedness tendency. This made it necessary to develop a special technique for the preparation of handsheets for this study. Three conditions had to be fulfilled: (1) The sheet had to be made in such a manner that none of the fines escaped. In other words, all the pulp must be retained. (2) The sheet had to be made so that none of the color was taken from it, since the loss of color from the top or bottom would spoil the sheet for investigation as to its two-sidedness. (3) Both the wire and felt side of the sheet had to be open for inspection.

Various sheetmaking methods, such as using filter paper or felt pads on a Büchner funnel, were tried but none of them fulfilled the three requirements. Finally, it was found that a fritted glass Jena 1-G-1 filter worked perfectly.

Eight-pound and two-pound dyeings per 1000 pounds of pulp of each of the six colors were made on all four fractions of both pulps. Sheets were formed on the Jena filter, pressed, and dried on a horizontal drier. Visual inspection was recorded and spectrophotometer curves were made with the General Electric recording spectrophotometer for the felt and the wire side of these sheets. These curves, as well as the visual examination, showed very definitely the increased affinity of all the dyestuffs for the fines. These curves also indicated that sheets made from individual fractions of the pulp showed no two-sidedness. Sheets made from dyed long fibers or fines were exactly the same color on the felt and wire sides. However, sheets made from the dyed original stock were more heavily colored on the wire side than on the felt side. This, of course, is just the opposite of machine conditions, but is to be expected since none of the fines were lost in the sheetmaking operations.

A second series of two- and eight-pound dyeings per 1000 pounds of stock was made as before, but this time the sheets were made on the Noble and Wood mold, using an 80-mesh covering. These sheets should come much nearer approaching machine-made paper. As it is impossible to make sheets from just fines, the two-sidedness effect of the fines was noted by adding about 10% fines to the long fibers and then dyeing the mixture. Color curves were made for both the felt and the wire side of the handsheets. The results were exactly the same as before. The sheets made from only long fibers showed no two-sidedness, yet every sheet containing fines was more heavily colored on the wire side. Evidently still not enough fines were lost through the wire side of the sheet.

A third series of dyeings was then prepared as before. The sheets were made on the Noble and Wood mold, using a 35-mesh covering so that the fines could more easily pass through the wire. Sheets made in this manner were still more heavily colored on the wire side.

The two-sidedness of the dyed sheet might have been caused in part by the drying of the sheets, because some dyestuffs tend to burn to the surface if not properly dried. In order to investigate this possibility, a fourth series of dyeings was made. This time the sheets were again made on the Noble and Wood mold, using an 80-mesh wire. Sheets were made in duplicate and then dried, one sheet with the wire side next to the drier, the other with the felt side next to the drier. It was found in every case that the wire side of the sheets was more heavily colored than the felt side. The colors of the two sides of duplicate sheets agreed perfectly, in spite of the manner in which the sheet was dried. This proved very definitely that the two-sidedness was not caused through the drying operation.

Fines

It is known that the concentration of fines on a sheet of paper made on the paper machine is greater on the felt than on the wire side. Because the colors of the two sides of handsheets were just the opposite of this, the fines must be concentrated on the wire side of a handsheet. Therefore, it was decided to investigate the location of the fines in a handsheet. Portions of fines were dyed, added to sized, undyed long fibers, and sheets made on the British mold. All sheets made in this manner were still more heavily colored on the wire side than on the felt side. The procedure was repeated, only this time the sheets were formed on the Noble and Wood mold, using an 80-mesh wire. Again the sheets were more heavily colored on the wire side. This seemed to prove very conclusively that the fines are concentrated on the wire side of a sheet made on a sheet mold. This can readily be seen from the brightness values of the sheets made for this part of the investigation. The values listed in Table IV under GERM are the brightness values determined on the General Electric reflection meter, and those under GERS are the values taken from spectrophotometer curves at a wavelength of 458 mμ.

TABLE IV.—REFLECTANCE VALUES

	GERM		GERS	
Color of fines added	Wire	Felt	Wire	Felt
Original	77.9	78.0	80.7	81.0
Dispersed vat color pigment	72.1	73.0	74.7	75.6
Phosphotungstate blue	70.8	72.4	73.5	75.2
Sky blue 6BX	74.5	75.4	76.7	77.9
Soluble Prussian blue	70.2	71.7	72.3	74.2
Orange II	73.6	74.7	75.7	77.0
Brilliant green crystals	68.3	70.1	70.4	71.5

During the course of the experimental work it had been noticed that the fines in suspension seemed to settle very fast. In all the fractionation and analytical work is was noticed that the fines would settle many times faster than the longer fractions of the pulp. Since this might be important in explaining the difference between the handsheet and paper made on the machine, qualitative determinations were made on the rates of settling of fines as compared with the long fibers. It was found that they settled much more quickly. This, no doubt, was due to their increased specific gravity and decreased hydrodynamic resistance.

Fiber Mat

The above information indicates that, in handsheet operations, the fines are concentrated on the bottom surface of the sheet. This is just the reverse of what happens on the paper machine. In the final analysis, this difference may be a fundamental one in the making of a sheet of paper on a paper machine and on a sheet mold. On the paper machine the stock flows on a fast moving wire. The ends of the long fibers are caught and straightened out until they are largely parallel to the wire. In this manner a filtering mat is formed. Meanwhile a proportion of the short fibers mixed with these long fibers have passed through the wire. This mat of long fibers tends to hold back the remaining fines, concentrating them on the top. White water running from the wire by the action of the table rolls has a much greater downward velocity than that running from a sheet mold. As a result, the fines are carried through the first film of fibers formed on the paper machine. In the sheet mold this film is strong enough to retain the fibers.

It has been shown above that fines have a faster rate of settling than the long fractions. On the paper machine there is little time for this settling to occur. For example, consider a machine running at 600 f.p.m. or 10 f.p.s. If the machine carries a sixty-foot wire, the sheet is formed in less than 15 to 20 feet, and in a maximum time of 1.5 to 2.0 seconds or less. This allows little time for settling out of the fines. In the sheet mold, following the usual procedure, the stock is stirred for 15 seconds, allowed to stand 15 seconds before drainage of the mold is started, and then the drainage is much slower than on a machine.

This means that the concentration of fines in the bottom half of the mold will be higher than that of the top. The consistency of the stock used on the paper machine is much greater than that used in the sheet mold. The stock consistency in the British mold is about 0.016%, which is such a dilute suspension of fibers that the conditions favor the settling of the fines. The stock running on the paper machine wire is so much heavier that the fines have less opportunity to settle out. The moment a slight film of fibers is formed on the wire of the mold these fines are retained, giving a heavier concentration of the fines in the bottom half of the sheet. This does not take place on the paper machine.

MECHANICAL EQUIPMENT

The table rolls of the paper machine are probably one of the greatest causes for this difference in the concentration of fines in the sheet. On one side of the roll there is, depending on the diameter of the roll and the speed of the machine, an upward washing action which tends to loosen the fines on the bottom of the sheet. On the other side of the roll there is a downward action which washes out the fine materials.

As the wet paper web reaches the suction boxes any loose particles in the web tend to be pulled through; the vacuum on such a sheet is much greater than that applied by any sheet mold.

The idea that the fines tend to float and hence are found on the top of the sheet seemed rather strange in view of the fact that they tend to settle faster, because they have a higher specific gravity than the long fibers, and because of their lower hydrodynamic resistance. It seems reasonable to explain the lack of fines on the wire side to loss by the methods just discussed. In mixed furnishes—e.g., a groundwood-sulphite mixture—the difference in specific gravity as well as the variation in affinity for dyestuffs of the various pulps will decidedly affect the two-sidedness.

For these reasons it may be safely assumed that the results obtained in this investigation are reversed from those of commercial operation only because of the differences in sheet making.

The investigation is of a preliminary nature, and only six coloring agents were examined. As the individual dyes for each class vary greatly in their dyeing characteristics, this investigation will be continued as time permits. This will include a study of the two-sided effect produced by other dyes commonly used by the paper industry and other factors, such as paper machine and handsheet production, and two-sidedness of the finished dyed sheets.

Conclusions

From the limited data obtained in the study of handsheets, using only six different types of colors, these conclusions can be drawn:

Fines have a greater affinity for dyestuffs because of: *(a)* the relatively larger percentage of pitch or resinous matter present; *(b)* the increased amount of degradation, hemicellulose, oxycellulose, etc., as shown by increased alkali solubility, increased copper number, decreased viscosity, and decrease of alpha-cellulose and increase in beta-cellulose; *(c)* their greater lignin content, which aids in the adsorption of basic dyestuffs.

Fines have a much greater tendency to settle because of their higher specific gravity and lower hydrodynamic resistance.

The fines are concentrated on the felt side of a sheet made on the paper machine, but on the wire side of a sheet made on a sheet mold. This is a result of the difference in conditions under which the sheets are made, fines being lost from the wire side on the paper machine because the sheet is formed so rapidly that there is no appreciable time for the fines to settle to the wire side of the sheet; there is a decided loss of fines occurring through the action of the table rolls and suction boxes.

Colored fines added to an undyed pulp and made into a sheet are so completely dispersed that they behave like pigment dyestuffs.

Sheets made from pulp of uniform fiber length show little tendency of being two-sided.

DYESTUFFS

The investigation of the six classes of dyestuffs leads to the following conclusions as to the characteristics of each class of dyestuff as judged from the study of only one dyestuff.

A. Direct dyes showed a marked affinity for cellulose, regardless of the fiber length. They differ with respect to the relative amount picked up by the fines and the long fraction, yet this difference is much smaller than in any other case. This class of dyestuffs, therefore, should have a minimum tendency for two-sidedness.

B. Acid dyestuffs show little affinity for cellulose but have a fair affinity for the fines. Two-sidedness is easily caused in drying when this type of dye is used. Orange II showed marked two-sidedness tendencies.

C. The basic dyestuff showed a marked affinity for the unbleached pulp, and a much less affinity for bleached fibers. The amount of dyestuff taken up by the fines was much greater in comparison with the other fraction. This dyestuff has strong two-sidedness tendencies.

D. Pigment dyestuffs have a fair degree of affinity for all fractions of the pulp. The amount of color taken up by the fines is the greatest, but the difference is less than with acid or basic dyestuffs. This class of dyestuffs will produce two-sidedness in machine operation.

E. Vat dyes have little affinity for cellulose fibers and retention is very poor. The fines still retain the greatest amount of color.

F. The phosphotungstic acid dyestuff had little affinity for cellulose fibers, the greatest amount of color again being retained by the fines. In light dyeings its two-sidedness tendencies should not be too great.

G. The variables in the dyeing of the long and short fibered fractions are minor in their effect in producing a two-sided colored sheet in comparison with the factors affecting sheet formation on the paper machine.

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Imports of Paper and Paper Making Stock

Giving Manifests of New York, Boston, Philadelphia and Other Ports of Newsprint, Wrapping, Writing, Coated, Blotting, Tissue, Strawboard, Wallboard, Cigarette Papers, Sulphite, Kraft and Ground Wood Pulp.

Importers may have their shipments listed in these columns by submitting records of imports to this publication.

NEW YORK IMPORTS

WEEK ENDING MARCH 7, 1942

SUMMARY

Newsprint .....5,468 rolls.

NEWSPRINT

——, ——, ——, 5,468 rolls.

RAGS, BAGGINGS, ETC.

American Cotton Products Co., ——, ——, 203 bls. picker waste.
New England Waste Co., ——, ——, 47 bls. cotton waste.
W. R. Grace & Co., ——, ——, 43 bls. cotton linters.
New England Waste Co., ——, ——, 93 bls. cotton linters.
Commercial National Bank Trust Co., ——, ——, 25 bls. cotton linters.

BONE GLUE

Katz Pfeiffer, Inc., ——, ——, 100 bags.
National City Bank, ——, ——, 220 bags.

HIDE GLUE

Katz Pfeiffer, Inc., ——, ——, 186 bags.
Katz Pfeiffer, Inc., ——, ——, 220 bags, (sheets).

CASEIN

——, ——, ——, 417 bags.
Casein Co., of America, Inc., ——, ——, 400 bags.
American Cyanamid & Chemical Corp., ——, ——, 4,336 bags.

Sealright Controversy Settled

FULTON, N. Y., March 7, 1942—Announcement is made here that a controversy regarding working conditions at the plant of the Sealright Corporation was settled this week following a conference between representatives of the International Brotherhood of Sulphite, Pulp and Paper Mill Workers and company officials. Officials of the union stated that 165 employees returned to work this week after being out for several days. Eight men were reported discharged in one department and the remainder of the help are said to have stayed out in sympathy. It was announced that all employees, including the eight discharged, returned without loss of seniority or other privileges.

New Chlorine Amendment Issued

WASHINGTON, D. C., March 11, 1942—Because of delay in printing Form PD-277, Amendment No. 1 to General Preference Order M-19 relating to chlorine will not go into effect until April 1, it was announced today by the Director of Industry Operations, J. S. Knowlson.

The Order limits the use of chlorine in a number of fields and was due to become effective February 25. The only change is that it will take effect April 1 instead.

British Newspapers To Be Cut

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., March 9, 1942—Word was received recently that British newspapers, which have been operating on one-sixth of their pre-war supplies, will undergo a further cut of 10%, beginning March 15. This will be effected by printing fewer papers and reducing circulation.

Most British newspapers have been getting along on four standard pages or eight tabloid pages a day and letting circulation expand.

The major factor in this forthcoming cut in newspaper allotments is the reduced imports of paper from Canada because shipping space is needed for war supplies.

Reports from London further indicate a price adjustment of newsprint is expected to take place in the near future. Canadian paper is landed in London at 24 pounds sterling a ton, while domestic production, supplying 100,000 tons a year, is at 28 pounds, 15 shillings a ton, making an average price of 26 pounds a ton. An upward revision is expected.

Michigan TAPPI Discusses Dyestuffs

On March 5 the Kalamazoo Valley Section of the *Technical Association of the Pulp and Paper Industry* held its regular meeting at the Park-American Hotel, Kalamazoo, Mich., with Fred Chappell Jr., chairman, presiding.

The President of TAPPI, Ralph A. Hayward, discussed the organization, growth, and development of the Association and outlined its functions and policies. Mr. Hayward emphasized the desire of the TAPPI National Headquarters to extend assistance and cooperation to the fullest possible extent to members, industry, and government.

Ivar Ekholm of the National Aniline and Chemical Division (of the Allied Chemical and Dye Corporation) led a discussion on dyes and dyestuffs used in the pulp, paper, and paperboard industry. Acid, basic, pigment, etc., including coal tar derivatives are widely used in the industry.

The next meeting will be held on April 2, 1942, Park-American Hotel, Kalamazoo, Mich. The subject for discussion will be the Electron Microscope and Its Application to Pulp, Paper, and Paperboard Problems.

D. J. Winton Heads Paper Branch

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 11, 1942—David J. Winton, chairman of the board of the Winton Lumber Company, Gibbs, Idaho, has been made chief of the WPB Pulp and Paper Branch of the Division of Industry Operations.

Also H. T. Rosenfeld, president of the Los Angeles Paper Bag Company, Los Angeles, Cal. is the new acting chief of the Toiletries and Cosmetics Branch of the same Division of WPB.

New York Paper and Pulp Market Review

OPA Seeks To Effect Joint Agreement On Price of Newsprint With Canadian Price Control Board—Price Ceiling On Woodpulp Not Yet Prepared — Sorting Problem Appears In Mixed Book Stock.

Office of the PAPER TRADE JOURNAL
Wednesday, March 11, 1942.

Demand for leading lines of paper and paper products continues very active, with the exception of some grades of book paper. More stability is widely reported. Reports received this week from many manufacturers' representatives, jobbers, and general paper merchants, reflect less anxiety as to adequate supplies in the future.

The index of general business activity rose to 136.7% for the week ended February 28, from 133.7% for the preceding week, compared with 123.0% for the corresponding week last year. Paper board production was unchanged.

Paper production for the week ended February 28 was estimated at 103.5%, compared with 90.5% for 1941, with 84.0% for 1940, with 83.5% for 1939, and with 67.8% for the corresponding week for 1938.

Paper board production for the week ended February 28 was 100.0%, compared with 80.0% for 1941, with 69.0% for 1940, with 70.0% for 1939, and with 59.0% for the corresponding week for 1938.

The situation is reported easier in bond papers, with production, however, continuing at capacity. About all the machines which normally change from one type of paper to another, as from book to writing, are reported in production to meet the heavy demand for writing papers. Demand for wrapping paper, container board and for kraft wrapping papers, are very heavy.

Newsprint prices are expected to be permanently stabilized for the duration of the war by a joint maximum price agreement between the OPA and the Canadian Wartime Prices and Controls Board, late this month, or by April 1. The announcement made sometime ago of a rise of $3 per ton to a price of $53 per ton by Canadian producers to American publishers, for the second quarter of this year, is expected to be thoroughly studied. It is expected that while the OPA is hopeful that a study of the cost data assembled by both government bureaus may result in the determination of an equitable price. No assurance is given, however, that the prevailing American price of $50 per ton will be continued in the second quarter by Canadian newsprint manufacturers.

Chemical Pulp

A price ceiling on woodpulp has been under consideration for sometime by the OPA and in view of that fact, Leon Henderson on March 9, suggested, "that pulp producers, in entering into contracts for the second quarter of 1942, refrain from inserting prices in their contracts at this time. The OPA is not yet prepared to release maximum prices".

Rags

Demand for new cotton rags is reported steady, with no important changes in prices at this date. Mill buying of roofing rags is actively maintained, with prices on all roofing grades conforming to the OPA schedule.

Old Rope and Bagging

A ceiling price of $115.00 per ton has stabilized No. 1 domestic Manila rope. Other grades are firm. Mill buying is reported steady.

Trading in scrap bagging is reported fair at this date. The OPA ceiling price affects only the roofing grade or No. 3 bagging, with the price of 1.35 reported quite well maintained.

Old Waste Paper

Reports from some mills indicate that the OPA price schedule on mixed books at 1.07, and No. 1 heavy book stock at 1.57, is creating difficulty in securing supplies of suitably graded raw material. Mixed book stock is reported to contain from 40% upward of groundwood, thus creating more sorting expense, which some dealers declare it is not possible to absorb under the present OPA price. A minimum rise of at least $8 per ton is viewed in some quarters of the trade as necessary to equitably adjust this labor cost.

The many drives for the collection of waste paper throughout the nation has served to inform the public of the importance of paper as a necessity, and to salvage, rather than destroy discarded paper of all kinds. A press dispatch from London states it is now a punishable offense to destroy or burn paper and paper board. A little paper may, however, be used in England to kindle fires and secret government papers may be burned.

Twine

Production and demand for major grades of twine continue to be reported at a high level. Prices are firm. The WPB has advised producers of binder twine that during this and the following month, twine made of agave fiber or sisal hemp, may now be delivered to and used by persons having contracts for delivery of sand bags on defense order. The twine is required to sew up sand bags.

Heads Eastco Sales Department

John E. Massengale, formerly Western district sales manager in charge of Eastern Corporation's Chicago Office, has been appointed sales manager for the company, moving to the company's headquarters in Bangor, Maine, to assume his duties.

Mr. Massengale is a capable paper man with a thorough knowledge of manufacturing, wholesaling and converting, gained through years of practical experience in the industry.

The appointment of Mr. Massengale to handle the distribution and sale of Eastco products maintains the high calibre of the company's personnel which Eastern Corporation has enjoyed for so many years. Mr. Massengale's many friends in the industry have expressed their pleasure at his appointment.

ELIXMAN

CAPS

Straight wound paper cores made in sizes from 2" to 10" inside diameter with any thickness wall required.

Long draw protected slot caps of heavy gauge steel in all standard sizes.

Heavy duty caps with reenforced square hole. This patented feature of reenforcement gives added strength and durability.

CORES

Samples of caps or cores will be gladly submitted

ELIXMAN PAPER CORE COMPANY, INC.

CORINTH, N. Y.

IS THE OLD PROVERB ABOUT THE BETTER MOUSE TRAP DEAD?

● Emerson's famous proverb is not **dead** . . . just **incomplete.** For today's products, and felts in particular, must not only be **made** right, they must be **specified** right.

Here is what has actually happened when Orr Felt representatives were given the chance to analyze problems:

One representative studied a problem, selected a certain Orr suction press felt for newsprint that cut steam consumption 500 pounds per ton. Another representative suggested a change in felts for a high-speed kraft application, actually increasing machine speed 26%. And still another man recommended a change in wet felts for hi-speed tissue, resulting in an increase in average felt life of from 40% to 60%.

Orr representatives are felt experts. When one calls on you, let him put his unique knowledge to work for you. His suggestions have often led to valuable savings.

ORR FELTS

THE ORR FELT and BLANKET CO.
PIQUA, OHIO

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL
Wednesday, March 11, 1942.

BLANC FIXE—Quotations on blanc fixe are firm and continue unchanged at prevailing market levels. Situation less tight at this date. The pulp is currently quoted at $40 per ton in barrels, at works; the powder is offered at $60 per ton, f.o.b., works.

BLEACHING POWDER—Prices on bleaching powder are firm. Shipments allocated to consumers. Prices stabilized by agreement with OPA. Bleaching powder is currently quoted at $2.25 per 100 pounds, in drums, at works.

CASEIN—Quotations on casein are firm. Demand reported fair for the week. Standard domestic casein, 20-30 mesh, is currently quoted at 27 cents per pound; 80-100 mesh at 27½ cents per pound; all prices in bags, car lots. Standard Argentina casein is currently offered at 24 cents per pound, c.i.f. No quotations on French casein.

CAUSTIC SODA—Prices on caustic soda are reported firm. Demand active for the current week. Solid caustic soda is currently quoted at $2.30 per 100 pounds, flake and ground at $2.70 per 100 pounds, in drums, at works.

CHINA CLAY—Quotations on china clay are firm and continue unchanged. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay at from $12 to $22 per ton, at mines. Imported clay is quoted at from $13 to $25 per long ton, ship side.

CHLORINE—Quotations on chlorine unchanged. Market under full priority control, with full allocation in effect. Chlorine is currently quoted at from $1.75 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—Quotations on some grades of rosin are unchanged for the current week. "G" gum rosin is currently quoted at $3.18 per 100 pounds, in barrels, Savannah. "FF" wood rosin is currently quoted at $3.18 per 100 pounds in barrels, New York. Seventy per cent gum rosin size is quoted at $3.47 per 100 pounds, f.o.b., works.

SALT CAKE—Prices on salt cake are firm. Demand steady for the current week. Domestic salt cake is currently quoted at $15 per ton in bulk; chrome salt cake at $16 per ton. All prices in car lots, f.o.b., shipping point. Quotations on imported salt cake are nominal at $16 per ton.

SODA ASH—Quotations on soda ash are firm and continue to conform to prevailing market quotations. Demand reported active. Quotations on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Prices on corn starch continue unchanged for the current week. Pearl is currently quoted at $3.10 per 100 pounds; powdered starch at $3.20 per 100 pounds; all prices in bags, car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—Quotations on sulphate of alumina are firm. Demand reported steady. The commercial grades are currently quoted at $1.15 per 100 pounds; iron free at from $1.75 to $1.85 per 100 pounds, in bags, car lots, f.o.b., works.

SULPHUR—Prices of sulphur are firm and continue to conform to prevailing market quotations. Annual contracts are currently quoted at $16 per long ton, f.o.b., mines. Spot and nearby car lots are quoted at $18 per ton.

TALC—Quotations on talc are firm and continue unchanged at prevailing market prices. Domestic talc is currently quoted at from $15 to $21 per ton, at mills. No quotations on imported talc.

MARKET QUOTATIONS

Paper

(Delivered New York)

News, per ton—			
Roll, contract	$50.00	@	—
Sheets	58.00	"	—
Kraft—per cwt.—Delivered Zone A			
Northern, Extra Quality	$6.00	@	$7.00
Superstandard	5.25	"	6.25
Northern Standard Wrapping	4.75	"	5.25
Standard Wrapping	4.75	"	—
Tissues Per Ream—Carlots			
White No. 1	1.12½	"	—
White No. 1 M. G.	1.05	"	—
White No. 1½	1.00	"	—
White No. 2	1.00	"	—
Anti-Tarnish M. G.	.95	"	—
Colored	—	"	—
Kraft	.95	"	—
Manila	.90	"	—
Unbl. Toilet, 1 M.	4.16	"	—
Bleached Toilet	5.70	"	—
Paper Towels Per Case			
Unbleached, Jr.	2.35	"	—
Bleached, Jr.	2.65	"	—
Manila—per cwt.—C. i. f. a.			
No. 1 Jute	8.75	@	10.75
No. 1 Manila Wrapping, 35 lb.	5.50	"	5.75
No. 2 Manila Wrapping, 35 lb.	5.25	"	5.50
Boards, per ton—			
News	*48.00	@	—
Chip	*45.00	"	—
Sgl. Mla. Lt. Chip	*60.00	"	—
White Pat. Coated	*75.00	"	—
Kraft Liners 50 lb.	*60.00	"	—
Binders Boards	85.00	"	—

* OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5.; basis 40-49, add $2.50; basis 90-100, add $5.; basis 101-120, add $5.

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
100% Rag Ext. No. 1	$40.25	@ $47.25	$41.40	@ $48.50
100% Rag	32.20	" 37.75	33.35	" 39.25
85% Rag	....	"	32.20	" 37.75
75% Rag	24.75	" 29.00	25.90	" 30.50
65% Rag	....	"	22.80	" 27.75
50% Rag	18.70	" 22.75	19.90	" 24.25
25% Rag	16.40	" 20.00	17.55	" 21.50

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items. Delivered in Zone 1:

	Bonds		Ledgers	
No. 1	$10.55	@ $12.75	$11.70	@ $14.25
No. 2	9.65	" 11.75	10.80	" 13.25
No. 3	9.20	" 11.25	10.35	" 12.50
No. 4	8.90	" 10.75	10.05	" 12.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper.

Delivered in Zone 1:

No. 1 Glossy Coated	$13.65	@	$15.50
No. 2 Glossy Coated	12.40	"	14.00
No. 3 Glossy Coated	11.60	"	13.25
No. 4 Glossy Coated	11.15	"	12.75
No. 1 Antique (watermarked)	10.25	"	11.75
No. 2 Offset	9.60	"	11.00
A Grade E. F.	9.35	"	10.75
A Grade S. & S. C.	9.60	"	11.00
B Grade E. F.	8.85	"	10.25
B Grade S. & S. C.	9.10	"	10.50
C Grade E. F.	8.55	"	9.75
C Grade S. & S. C.	8.80	"	10.00
D Grade E. F.	8.25	"	9.50
D Grade S. & S. C.	8.50	"	9.75

Ivory & India at $.50 cwt. extra.

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—			
Moist	No prices		
Dry	No prices		
(Delivered)			
No. 1 Domestic and Canadian	40.00	@	45.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—			
Prime Bleached Sulphite	3.62½	@	4.71
Prime Qualities—			
Easy-Bleaching Sulphite	3.17½	"	4.21
Strong Unbleached Sulphite	3.17½	"	4.21
News Grade, delivered			
Unbleached Sulphite	63.75	"	67.71
(On Dock, Atlantic Ports)			
Kraft Bleached	4.12½	"	—
Kraft Light & Strong	No price		
Kraft No. 1	No prices		
(Delivered)			
Kraft Domestic and Canadian	3.00	"	4.00
(Delivered)			
Soda Bleached	3.30	"	—

Add 60 cents per short ton, dues charges for Albany; $2.50 for Lake Ports East and $3.50 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	8.00	@	8.25
Silesias No. 1	4.50	"	4.75
New Unbleached	8.00	"	8.25
Blue Overall	5.75	"	6.00
Fancy	3.00	"	3.25
Washables	2.50	"	2.75
Mixed Khaki Cuttings	2.50	"	2.75
O. D. Khaki Cuttings	3.00	"	3.15

Old Rags

White, No. 1—			
Repacked	*3.80	"	—
Miscellaneous	*3.20	"	—
White, No. 2—			
Repacked	*2.90	"	—
Miscellaneous	*2.65	"	—
Third and Blues—			
Repacked	*2.20	"	—
Miscellaneous	*1.80	"	—
Roofing Rags—			
No. 1	*1.55	"	—
No. 2	*1.45	"	—
No. 3 (bagging)	*1.35	"	—
No. 4	*1.35	"	—
No. 5A	*1.35	"	—
* Old Manila Rope	5.75	"	—

*OPA Maximum Prices.

Foreign Rags

All prices nominal

New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.50	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxfords	4.00	"	4.50
New Light Prints	3.00	"	3.25

Old Rags

No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—
No. 4 White Linens	2.25	@	3.25
No. 1 White Cotton	4.25	"	4.75
No. 2 White Cotton	3.25	"	3.75
No. 3 White Cotton	2.50	"	3.00
No. 4 White Cotton	1.90	"	2.20
Extra Light Prints	2.00	"	2.40

West Virginia Pulp and Paper Company

230 Park Ave. New York
35 East Wacker Drive Chicago
Public Ledger Building Philadelphia, Pa.
503 Market St. San Francisco, Cal.

Manufacturers of
ENGLISH FINISH SUPERCALENDERED
MACHINE FINISHED BOOK
and LITHOGRAPHIC PAPERS

Offset, Envelope, Bond, Writing, Mimeograph, Ledger, Eggshell, Cover and Music Papers, Index Bristol, Post Card and Label Papers

HIGH GRADE COATED BOOK

• • • •

KRAFT WRAPPING AND KRAFT ENVELOPE
KRAFT LINER BOARD
BLEACHED SULPHITE AND SODA PULP
BLEACHED AND UNBLEACHED KRAFT PULP

MILLS:
Mechanicville, New York
Luke, Maryland
Covington, Virginia
Tyrone, Pennsylvania
Williamsburg, Pennsylvania
Cass, West Virginia
Charleston, South Carolina

More than just a TRADE MARK

EXCELSIOR KNOX Woolen Co. Camden, Me. FELTS & JACKETS

BUT also a guarantee by men who for 78 years have prided themselves in making finer felts. TO YOU —this is the mark of dependability, longer felt life and greater saving.

KNOX WOOLEN CO.
CAMDEN, MAINE.

TOUGH — and we mean TOUGH!
PAPER MILL CORES

RHINO NON-RETURNABLE

For all uses that require an extremely tough, strong, durable product, SONOCO has developed the new RHINO non-returnable paper mill core. Exhaustive tests for breaking and crushing strength and all around toughness indicate its superior qualities.

Returnable Cores
Equipped With
BERMICO* Metal Ends

DURO is a standard core of plus-standard quality. Made from our own especially manufactured paper stock. DURO cores are made standard 3⅛" I. D. These cores are equipped with BERMICO open or closed notch, metal ends to fit 3" shaft. TAYLOR Ends that protect inside of core only, can also be specified.

EN-DURO a super-quality core to meet extra demands for strength and service where needed. This is our highest grade core. All cores will take either BERMICO or TAYLOR Ends which can be furnished lacquered in various colors for easy identification. . . Both DURO and EN-DURO cores have a thick kraft surface cover.

Exclusive distributors
BERMICO (Reg. Trade Mark) ENDS and BERMICO (Reg. Trade Mark) FIBRE CORES

Strong cellulose fibers are formed into a homogeneous tube and then especially treated to resist all weather and moisture changes. The Bermico Core is light in weight and extremely hard, strong, rugged. These particular cores have exceptionally long life in either reasonable or mill roll service.

*(Reg. Trade Mark)

SONOCO PRODUCTS COMPANY
BRANTFORD ONT. HARTSVILLE S. C. MYSTIC CONN.
SHIPPING POINTS: LOWELL, MASS. HARTSVILLE, S. C.
DEPENDABLE SOURCE OF SUPPLY

Ord. Light Prints...	1.75	"	2.15
Med. Light Prints...	1.55	"	1.95
Dutch Blue Cottons.	2.25	"	2.50
French Blue Linens.	3.00	"	—
Checks and Blues...	2.00	"	—
Linsey Garments....	1.90	"	2.00
Dark Cottons.....	1.50	"	1.60
Old Shopperies.....	1.30	"	1.45
New Shopperies.....	1.45	"	1.50
French Blues.....	2.25	"	2.50

BAGGING

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	4.00	@	4.25
Wool Tares, light....	4.25	"	4.50
Wool Tares heavy..	4.50	"	4.75
Bright Bagging.....	4.50	"	4.85
Manila Rope—			
Foreign	—	"	—
Domestic	*5.75	"	—
Jute Threads.....	4.25	"	4.75
Sisal Strings.....	3.25	"	3.75
Mixed Strings.....	1.10	"	1.20

* OPA Maximum Price.

Old Waste Papers

(F. o. b. New York)

OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Envelope Cuts....	3.12½	"	—
No. 1 Hard White Shavings, unruled.	2.87½	"	—
No. 1 Hard White Shavings, ruled...	2.50	"	—
Soft White Shavings, one cut.....	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Mixed Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
Mixed Groundwood Colored Shavings..	.90	"	—
Overissue Magazines	1.67½	"	—
No. 1 Heavy Books & Magazines.....	1.57	"	—
Mixed Books.....	1.07½	"	—
No. 1 White Ledger	2.17½	"	—
No. 2 Mixed Ledger, colored	1.87½	"	—
New Manila Envelope Cuttings, one cut..	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
Extra Manilas.....	1.85	"	—
Mixed Kraft, Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
Triple Sorted, No. 1 Brown Soft Kraft.	2.50	"	—
New 100% Kraft Corrugated Cuttings..	2.25	"	—
No. 1 Assorted Old Kraft	1.75	"	—
New Jute Corrugated Cuttings	1.75	"	—
Old Corrugated Containers	1.00	"	—
Box Board Cuttings.	.72½	"	—
White Blank News.	1.65	"	—
Overissue News.....	.85	"	—
No. 1 News.....	.75	"	—
No. 1 Mixed Paper.	.70	"	—

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.21	@	—
White Hemp.....	.21	"	—
Fine Polished—			
Fine India.....	.26	"	—
Unpolished—			
Box	.17¼	"	—
Paper Makers.....	.17	"	—
Tube Rope.....	.19	"	—
Wall Paper.....	.20½	"	—
Wrapping	.23	"	—
Soft Fiber Rope...	.19	"	—
Cotton	.25	"	—
(Hard Fiber)			
Medium Java.....	.18	"	—
Mex. Sisal.....	.16	"	—
Manila	.26	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White No. 1.	.07¼	@	.07½
New White No. 2.	.04½	"	.05
Light Silesias.....	.04½	"	.04¾
Silesias, No. 1....	.04	"	.04¼
Black Silesias, soft	.03¾	"	.04
New Unbleached..	.07¼	"	.07½
Washable Prints...	.03¾	"	.03½
Washable No. 1..	.02	"	.02¼
Blue Overall.....	.04½	"	.05½
Cottons—According to grades—			
Washable shredding	—	"	.01¾
Fancy Percales....	.03½	"	.03½
New Black Soft...	.02¾	"	.03
New Dark Seconds	1.75	"	2.00
Khaki Cuttings—			
No. 1 O. D.....	.03	"	.03¼
No. 2 Mixed.....	.02¼	"	.02½
Corduroy	.01¾	"	.02¼
New Canvas.....	.04¾	"	.05¼
New Black Mixed.	—	"	.02½

Domestic Rags (Old)

White No. 1—Repacked	3.80	"	—
White No. 2—Repacked	2.90	"	—
Miscellaneous No. 1.	3.20	"	—
Miscellaneous No. 2.	2.65	"	—
Thirds and Blues—			
Miscellaneous	1.80	"	—
Repacked	2.20	"	—
Black Stockings— (Export)	Nominal		
Roofing Stock—			
Foreign No. 1.....	Nominal		
Domestic No. 1...	1.55	"	—
Domestic No. 2...	1.45	"	—
Roofing Bagging..	1.35	"	—
Old Manila Rope...	5.75	"	—

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	Nominal		
Domestic	3.00	"	3.50
Sisal Rope.....	3.75	"	—
Mixed Rope.....	.75	"	1.00
Scrap—			
No. 1.....	3.25	"	3.50
No. 2.....	1.75	"	1.80
Wool Tares, heavy...	4.00	"	4.25
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	3.75	"	4.00

Old Papers

(F. o. b. Phila.)

OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled..	2.50	"	—
Soft White Shavings, one cut.....	2.87½	"	—
White Blank News..	1.65	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 White Ledger.	2.17½	"	—
No. 2 Ledger, colored	1.87½	"	—
No. 1 Heavy Books & Magazines.....	1.57	"	—
Overissue Magazines	1.67½	"	—
New Manila Envelope Cuttings	2.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper.	.70	"	—
Box Board Cuttings.	.72½	"	—
Jute Corrugated Cuttings	.90	"	—
Overissue News.....	.85	"	—
No. 1 News.....	1.00	"	—

BOSTON

Old Papers

(F. o. b. Boston)

OPA Maximum Prices

No. 1 Hard White Shavings, unruled.	2.87½	"	—
No. 1 Hard White Shavings, ruled...	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
New Manila Envelope Cuts, one cut.....	2.87½	"	—
Hard White Envelope Cuts, one cut.....	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft.	2.50	"	—
Mixed Kraft Env. & Bag Cuttings.....	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
No. 1 Heavy Books & Magazines.....	1.57	"	—
New Manila Envelope Cuts, one cut.....	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White Blank News..	1.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper.	.70	"	—
Overissue News.....	.85	"	—
Box Board Cuttings.	.72½	"	—
New Corrugated Cuttings, Kraft.....	2.25	"	—
Old Corrugated Containers	1.00	"	—
Jute Corrugated Cuttings	1.07½	"	—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	4.25	@	—
Sisal Rope.....	4.00	"	4.25
Mixed Rope.....	1.00	"	1.25
Transmission Rope—			
Foreign	(nominal)		
Domestic	3.50	"	3.75
Manila Rope—			
Foreign	(nominal)		
Domestic	5.75	"	—
Soft Jute Rope.....	5.25	"	5.50
Jute Carpet Threads.	3.25	"	3.50
Bleachery Burlap....	8.00	"	8.50
Scrap Burlap—			
Foreign	(nominal)		
Domestic	—	"	4.00
Scrap Sisal.....	4.00	"	4.25
Scrap Sisal for Shredding	4.25	"	4.50
Wool Tares—			
Foreign	(nominal)		
Domestic	4.25	"	4.50
Aust. Wool Pouches.	5.25	"	5.50
New Burlap Cuttings	4.50	"	5.00
Heavy Baling Bagging	5.00	"	5.50

Old Papers

(F. o. b. Boston)

OPA Maximum Prices

Paper Mill Bagging..	3.00	"	3.25
No. 2 Bagging.....	1.35	"	—

* OPA Maximum Price.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints.	.04½	@	.04¾
Fancy Percales....	.04¼	"	.05
New White No. 1.	.08	"	.08¼
New Light Flannelettes	.06	"	.06¼
Canton Flannel, Bleached	.08¼	"	.08½
Underwear Cutters, Bleached	.08	"	.08¼
Silesias No. 1.....	.04½	"	.05
New Black Silesias..	.03½	"	.04
Red Cotton Cuttings	.03½	"	.04
Soft Unbleached....	.08½	"	.08½
Blue Cheviots....	.04¾	"	.05
Fancy	.02¾	"	—
Washable	.01¾	"	—
Cottons—According to Grades			
Blue Overalls.....	—	"	.05½
New Black, Soft	.03¼	"	.04
Khaki Cuttings.....	.04	"	.04¼
O. D. Khaki.....	.04½	"	.04¾
Corduroy	.02	"	.02½
New Canvas.....	.06	"	.06½
B. V. D. Cuttings...	.07¾	"	.08

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.80	@	—*
Miscellaneous	3.20	"	—*
White No. 2—			
Miscellaneous	2.65	"	—*
Twos and Blues, Repacked	2.20	"	—*
Old Blue Overalls...	2.25	"	2.50
Thirds and Blues, Repacked	2.20	"	—*
Miscellaneous	1.80	"	—*
Black Stockings.....	3.50	"	4.00
Roofing Stock—			
No. 1.....	1.55	"	—*
No. 2.....	1.45	"	—*
No. 3.....	1.35	"	—*
No. 4.....	1.35	"	—*
No. 5, Quality A..	1.35	"	—*
Quality B..	1.20	"	—*
Quality C..	.95	"	—*
* Old Manila Rope..	5.75	"	—

* OPA Maximum Prices.

Foreign Rags

(F. o. b. Boston)

Canvas	(nominal)
Dark Cottons.....	(nominal)
Dutch Blues.....	(nominal)
New Checks and Blues	(nominal)
Old Fustians.....	(nominal)
Old Linsey Garments.	(nominal)
New Silesias.....	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)

OPA Maximum Prices.

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled.	2.50	"	—
No. 1 Soft White Shavings	2.50	"	—
No. 1 White Ledger	2.17½	"	—
No. 1 Heavy Books & Magazines.....	1.57	"	—
White Blank News..	1.65	"	—
Mixed Kraft Env. & Bag Cuttings..	2.75	"	—
No. 1 Assorted Old Kraft	1.75	"	—
Overissue News.....	.85	"	—
No. 1 News.....	.75	"	—
No. 1 Mixed Paper..	.70	"	—
No. 1 Roofing Rags..	1.55	"	—
No. 2 Roofing Rags..	1.45	"	—

Boys to Patrol B. C. Forests

High school and college boys are expected to patrol the forests of British Columbia this summer and protect them against possible incendiary fires and it may be necessary for them to quit school in mid-May to take necessary training courses, according to Lands Minister A. Wells Gray.

Mr. Gray said he had asked Ottawa for authority for a battalion of youths (between 800 and 1000), and sufficient fire-fighting equipment to keep British Columbia's forests from destruction should bomb fires ever start in the tinder-dry forests.